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AMERICAN RED CROSS ABRIDGED TEXT-BOOK

ON

FIRST AID

GENERAL EDITION

A MANUAL OF INSTRUCTION

BY

COLONEL CHARLES LYNCH

MEDICAL CORPS, UNITED STATES ARMY

Prepared for and Endorsed by the American Red Cross

THIRD EDITION

WITH 67 ILLUSTRATIONS

PHILADELPHIA

P. BLAKISTON'S SON & CO.

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PREFACE TO THIRD EDITION

The present edition of this first aid manual has been carefully revised and rearranged in accordance with the lessons of the world war and with further practical experience gained in actually teaching first aid to the injured. Advantage has also been taken of the many suggestions made by teachers who have had opportunities to observe the best and most practical methods of instruction. Their valuable assistance is gratefully acknowledged, as is also that of Doctor John D. McCarthy of New York City, who has carefully studied the manuscript and has made many important suggestions. Grateful acknowledgment is made to Dr. R. R. Sayers, U. S. P. H. Chief Surgeon of U. S. Bureau of Mines, for help; also to the Director of the U. S. Bureau of Mines for the use of First Aid photographs for illustrations. It will be found, as has been the case with previous Red Cross first aid manuals, that certain chapters in this edition, those of interest to all first aid students, correspond with similar chapters in another edition prepared at the same time, while other chapters appear solely in this edition. The present edition is styled the General Edition as it is designed for general use.

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INTRODUCTION

The first object of first aid instruction is to prevent accidents by educating the individual to use what care may be necessary in the special circumstance; then too prompt treatment is in itself a measure of prevention, for if the right thing is done quickly, the injured person is at once put in condition so the services of the doctor can be made of the most value. Study of first aid is of great practical value not only to the individual, but to the public at large, and not only in our industries but everywhere. The extensive experience of the Red Cross has demonstrated that the accident rate among miners who have been instructed in first aid and accident prevention, is 75 per cent less than among the uninstructed.

The purpose of instruction in First Aid to the Injured offered by the American National Red Cross is to train men and women to administer First Aid treatment promptly and intelligently when emergencies demand it. First Aid treatment is not intended to take the place of a physician's services. A surgeon should always be summoned, as a precautionary measure, when there is an injury of any consequence, but there are times when one cannot be secured and a few minutes' delay may mean a fatality. In such a case, a person trained in First Aid is invaluable not only to the individual but, through him, to the community in which he lives. Every man or woman, boy or girl who is thus equipped becomes thereby a more helpful member of society.

There is, perhaps, no way of ascertaining the number and variety of accidents which occur in the home or the number of deaths or serious disablements which result from the lack of proper safeguards or prompt emergency treatment. It is safe to assert, however, that they number thousands

daily. There can be no doubt that the application of First Aid methods to each case would immeasurably lighten the country's toll of suffering and death.

The dissemination of First Aid training and information has already produced a far-reaching and beneficial influence in the prevention of accidents on railroads, in mines, and in great industrial concerns, the employees of which are peculiarly liable to casualties. To the truth of this statement employers of labor have borne ample testimony.

Such training also fits a person for usefulness in great disasters. The benefit of a widespread knowledge of First Aid in the event of a great disaster, such as a train wreck, an explosion, an earthquake, etc., is obvious. It often happens that the physicians under such circumstances cannot meet the demand for their services, and laymen who have had First Aid training can render efficient assistance. Many lives may depend upon such emergency care.

The startling statistics, which are published in our daily press and periodicals show the effects of accidents on our national life and call for a widespread and far-reaching remedy. The Red Cross aims to supply the remedy in two ways.

First, by education of the public, the employer and employee, especially the great need and value of safety and accident prevention.

Second, by offering certain specified courses in First Aid to the injured.

The Red Cross course of instruction in First Aid steps in here and not only points out to each individual the special dangers of his occupation, but teaches him ways of preventing accidents and caring for injuries when accidents occur.

What Red Cross First Aid Work Includes

Red Cross First Aid work includes the following activities:

1. The formation and conducting, through Red Cross Chapters, of classes for instruction in First Aid to the Injured among men and women in all communities and in every industry.

2. The introduction of courses of instruction in high schools and colleges.

3. The creation of a volunteer reserve force of men, trained in First Aid to the Injured, which will be qualified for duty with any Red Cross organizations formed for service with the armed forces of the United States in time of war.

4. The stimulation of interest in and encouragement of proficiency in First Aid methods through the promotion of first aid contests.

5. The preparation of up-to-date books and other literature on First Aid and the designing and standardizing of First Aid materials.

6. Co-operation with other organizations in the dissemination of information on Accident Prevention and First Aid methods.

Some Things Already Accomplished

In the latter part of 1909, authority for the establishment and organization of First Aid work was granted by the governing body of the American Red Cross. Its actual organization dates from January 2, 1910.

During the past fourteen years, First Aid representatives of the Red Cross have covered nearly all the territory of the United States, the total distance traveled amounting to 500,000 miles.

During that time over 500,000 persons have received instruction in First Aid among railroad employees alone. Some 250 logging and lumbering camps have been visited, Red Cross representatives reaching in round numbers 125,000 persons engaged in that industry. The Red Cross has succeeded in getting the Associated Bell Telephone Companies to adopt First Aid as a permanent policy, and thousands of telephone employees have annual First Aid courses. The Red Cross also co-operates with the U. S. Bureau of Mines in First Aid instruction. The mine law in most

Mining States requires a certain number of trained First Aid men in each mine. The First Aid service of the Red Cross also co-operates with the Boy Scouts of America, the Girl Scouts, and Camp Fire Girls.

Frequently physicians of the First Aid Service staff have been loaned under mutually agreeable conditions to telephone companies, mines, mills, quarries, and other industries for the purpose of instructing their employees.

An enormous amount of First Aid work has been done in the last year in the schools of the country.

An organization devoted to life-saving in the cities on the coast, Great Lakes, and rivers of the country was inaugurated on February 1, 1914. This branch of the work, which is really "Water First Aid," is known as "The American Red Cross Life Saving Corps." Expert life-savers are on the staff of the Red Cross and act as instructors and organizers of life-saving corps. Since its inception, local life-saving corps have been started in various sections of the country and the membership is steadily increasing.

The Life-Saving Corps are for both men and women, and Life-Saving Crews for juniors are now also organized under Red Cross auspices. Information regarding the organization of all such, the granting of charters and other data will be found in pamphlet A R C 1002, which may be obtained from the local Chapter or from the Division Office.

At the present time Red Cross Chapters thoughout the country are giving first aid training. Furthermore, first aid instruction has been extended to many colleges and schools. Very lately the Red Cross has arranged with the War Department to give first aid instruction to Army training camps.

From 1910 to 1924, 189,260 persons took and completed a Red Cross first aid course of 10 lessons with a minimum of 15 hours' instruction and received a Red Cross First Aid Certificate. All the classes were taught or supervised by a physician and the final examination was in charge of a physician.

Important factors in spreading knowledge of first aid to the injured have been first aid contests and annual prizes for especially creditable work. The American Red Cross has been very active in promoting contests and has set aside and received funds through which it has been possible to offer prizes every year.

Early in the Red Cross First Aid campaign, instruction books, charts and first aid materials including boxes for every emergency were prepared by the first aid department. These have been brought up to date. Much testimony has accumulated in the form of letters and personal communication to prove that the books and materials in question have relieved a great deal of suffering and have been responsible for saving many lives.

AMERICAN RED CROSS TEXT-BOOK ON FIRST AID

GENERAL EDITION

LESSON I

WHAT FIRST AID TO THE INJURED IS; GENERAL DIRECTIONS FOR GIVING FIRST AID; SHOCK

What First Aid to the Injured Is

Definition.—First Aid to the Injured is what is done first in accident not with any idea of cure but in order by prompt action to prevent death, or in less dangerous cases, and these are far the more common, to prevent further harm being done and so to put the victim of the accident in the best possible condition for later and more extensive treatment. As prevention is now recognized as far better than cure in injury as well as in disease modern first-aid instruction also teaches how to prevent accidents.

First Aid is the bridge that takes the injured safely over the danger of an exhausting or fatal hemorrhage of an infected or blood poisoned wound, a crooked leg, or a stiff joint, and puts into the hands of the hospital or surgeon a man who has lost less blood, has a cleaner wound, a straighter leg, who suffers less pain, less shock, and is in every way stronger and in better condition for the hospital and the surgeons, further professional care.

We all know, of course, that a doctor, as he has given years to studying the subject, is best qualified to take care of

injured. On the other hand, accidents often occur where the services of physicians cannot be immediately obtained. The necessary delay may result very disastrously. A very large experience has shown that an intelligent person can learn what to do in such emergencies. First Aid to the injured must be learned, however, like every other subject and no one will know what to do unless he has studied it. But all that is necessary for good results is that the student have common sense and devote the small amount of time required for acquiring the special knowledge and skill.

There is no clashing of interest between the doctor and the first aider. The duties of the former begin when the latter leave off. Knowledge of First Aid enables trained persons to put the victims of accidents into doctors' hands in the best possible condition for cure. Treatment, except of very minor cases of injury and the care of injured in an emergency till a doctor can be procured is not first aid. Playing the doctor cannot be learned from this book, and cannot be too strongly condemned.

The attention of every student of First Aid is earnestly invited to the great benefits to be gained by studying how to prevent accidents as part of his or her course in first aid. Prevention is better than cure in injury as well as in disease and is just as practical. In both, good results in this respect are mainly dependent on the action of individuals. Every injury described in this book should suggest how the accident which caused it might have been prevented. Still more, if any first aider cares for a real injury he or she should think over the cause for it carefully and so far as within their power take steps to prevent a similar accident in the future.

Remember always that the treatment given in the first few moments may mean life or death but, on the other hand, do not attempt to give treatment which should only be given by a skilled physician and do not fail to call a doctor when necessary or when in doubt.

General Directions for Giving First Aid

You are walking along a street. You see a small crowd of people and when you reach the spot you find a man lying on the ground. What should you, as a first aider, do?

If a doctor is present when an accident occurs you should, of course, offer to help him and he undoubtedly will tell you just what to do. On the other hand, a doctor may not be present. Then you are thrown wholly on your own responsibility for the time being. If you are to prove of service you must take control of matters. You, from having studied First Aid, are far better fitted to do so than people who have not had this valuable instruction.

In justice to the injured person you must not allow interference by other persons. The only persons who should be near an injured man are those required to help him. He needs all the air he can get and a crowd about him will use air that he should have. You must explain to any helpers just what you want them to do.

Be observant. Everything depends on this. Look for everything wrong and if you find one injury do not stop till you have found them all, if you use your eyes and your hands carefully you are not likely to make a mistake.

Be calm and don't be hurried. Be quiet and cool. Be gentle and considerate.

If a doctor is within immediate call it may hardly be necessary for the first aider to do more than to send for the doctor and to keep people away from the injured person. The action taken depends on the injury, however; for example, it would be very foolish to wait a moment for a doctor if there were danger of death from bleeding or in any accident where delay would be dangerous. On the other hand, often it may be better to have a doctor care for the injury from the first. In giving first aid it is quite as necessary to know what *not* to do as what to do. In any case if the services of a doctor can be had it is always best to employ them, except for slight injuries. Moreover, if any

doubt exists in regard to this, it is best to send for a physician or to take the injured person to a doctor as soon as possible. It should be remembered that injuries which are apparently trivial may sometimes, if not treated promptly by a doctor, have serious consequences, and that a physician called in time may prevent conditions which when fully established are beyond the help of medical science.

Generally speaking, if something special does not need immediate attention, the first thing to do is to get the injured person into a safe and comfortable position. The best position, unless there is some reason to the contrary, is on the back with the head low. With a flushed face, the head may be raised on a small pillow or folded coat; with a pale face, it should not be raised at all. If a person is vomiting, he should be placed on his side or his head should be turned to one side, so that the matter vomited will not go into his windpipe and choke him. Unconscious persons cannot swallow and so they should never be given water, stimulants, etc., as these will choke them by entering the windpipe. Slight cases of illness and injury may sit up, but one must be sure that all seriously injured are kept lying down.

Tight clothing interferes with both breathing and circulation. The collar should be loosened at once. Also loosen the belt and any other tight portion of the clothing.

Do not be hurried into moving a person from the place where his accident has occurred and always make sure first that he is not going to be injured further by being moved. It is specially dangerous to move persons with broken bones before proper treatment has been given as the ends of the broken bones are very sharp and cut like a knife.

A hurt person will frequently ask for water, which may be given with perfect safety. Cold water is usually more refreshing, but whether cold or hot, it must be given fairly slowly so that the injured person has time to swallow between sips. The first thought with many people is to

give whiskey or brandy. This is not necessary and may do a great deal of harm.

Whatever the injury may be, it must be seen clearly before any attempt is made to treat it. In order to do this it will generally be necessary to remove some of the clothing. This is likely to be very painful and possibly dangerous for the injured person, unless he is handled with the greatest gentleness. In removing clothing, rip up the nearest seam in the outer clothing and cut or tear the underclothing. The sound side should be undressed first so that the injured side will be subjected to less movement. In injuries to the foot and ankle it will rarely be possible to remove the boots or shoes without giving severe pain and perhaps doing considerable damage, so they should be cut freely when this is necessary. An injured person should be covered warmly and not exposed more than absolutely necessary as loss of the body heat increases shock.

When there are several injuries the most severe should be cared for first.

Shock

More or less shock is caused by *all* injuries. This fact must never be forgotten as shock unless slight requires prompt treatment.

How would you recognize shock and what would you do for it?

Description.—Shock is sometimes called collapse or prostration. It not infrequently accompanies serious injuries to such a degree as in itself to imperil life. It is characterized by pallor, rapid pulse, sweating, thirst, shallow breathing and low blood pressure. Yet while shock is so common, what actually happens in shock is none too well understood. It is generally agreed that the essential factor in shock is stagnation of blood somewhere in the body. Shock therefore has an effect very like severe bleeding. In both the blood does not circulate well and in consequence damage results from the various parts of the

body failing to get as much blood as they need. With both, too, the result which must be accomplished is to restore adequate flow of the blood. In both shock and bleeding it is likewise true that blood stagnates in the capillaries. This is the reason why heat is so important in both for cold increases the stagnation of blood in the capillaries and thus prevents reaction on the part of the body.

Causes.—Usually a severe injury. Some persons are sensitive to shock, however, and so with them more shock will follow a slight injury than is the case with a severe injury in less sensitive persons.

Prevention.—The prevention of accidents, especially severe accidents. Also do not allow an injured person to see his own injury, as this is apt to increase shock. This is especially true with severe bleeding.

Symptoms.[1]—Suppose we first consider a case of severe shock. A person is injured by being struck in the abdomen by an automobile. There is no external evidence of injury but, nevertheless, immediately after the accident his appearance becomes alarming.

He lies perfectly quiet and pays no attention to what is happening around him. He stares perfectly straight before him. His pupils are large. His skin is as pale as marble. His hands and lips have a bluish tinge. Large drops of sweat hang on his forehead and eyebrows. His whole body is cold.

He is not nearly as sensitive as usual. He pays no attention to pinching his skin unless the pinch is very severe and then he will make a wry face and perhaps a weak movement.

If a limb is lifted and then let go it will fall as if dead.

The pulse is almost imperceptible and very rapid.

The shocked person is conscious but replies slowly and only when repeatedly questioned.

[1] This is a word whose meaning should be known to every first aider. Symptoms are everything that an injured or ill person shows or feels because of an injury or disease.

On being asked how he feels, he complains of cold, faintness and deadness in his limbs.

His breathing is changed. He takes long, deep sighing breaths alternated with very shallow ones.

He may vomit and then be nauseated and have hiccoughs.

What has happened? This has already been explained. Shock has resulted in stagantion of the blood and the whole body is suffering because its various parts are not getting the blood they need.

Usually shock is recovered from, the improvement being gradual, but the shock may grow worse and death finally occur.

It might be thought any one should easily know when a person is suffering from shock. This is the case usually but not invariably. If you see the accident and its effect you can hardly make a mistake but suppose you do not see the accident then you may have nothing to judge by except the symptoms just given.

It should be noted here that shock is not necessarily nearly as severe as that described. It varies from this to nothing more than momentary paleness, weakness and perhaps some nausea. You have mild shock when you hit your finger hard with a hammer.

Treatment.—Send for a doctor at once. Shock is too serious a condition for you to try to treat yourself unless it is very slight. But do not wait for the doctor to come before beginning treatment.

It would be a fine thing if we had some drug which, in shock, would relieve the stagnation of the blood. But no such drug has yet been discovered. This being the case what we must do is to put the shocked person in the most favorable condition to recover from his shock.

Moreover, at the same time, we must be careful to prevent anything which will increase shock.

Heat, position and stimulants are the important things on which we must rely in treating shock.

Heat is most valuable in shock and every first-aid student should know how to make use of it. Ordinary hot-water bags are most convenient for this purpose, but glass bottles and jars are good. Preferably, the latter should be covered with cloth or paper to prevent them from burning. Hot bricks and stones are also useful. In using heat in this way it must be remembered that, especially with an unconscious person, there is considerable danger of causing severe burns, so one must make sure by testing the bottle, etc., on his arm or face, that it will not burn even if left in contact with the skin for some time. In applying heat by means of the objects mentioned, they should be placed between the legs, at their outer sides and between the body and the arms. A light hot-water bag lying over the heart acts as a special stimulant to it. Don't be afraid of using too many hot water bags or the like.

Loss of the body heat always increases shock. So we must guard against this. Never remove more clothing than necessary from an injured person and always spread blankets or coats over and under him.

Blankets should be placed both over and under a shocked person so as to prevent heat escaping. Use them, or coats if you have no blankets, whatever else you do.

Rubbing the limbs toward the body will help if it can be done without otherwise cooling the person. Be careful while rubbing him that he is not uncovered. A hot room is much better for a person in shock than a cold one.

Position.—Place the shocked person on his back with his head low so that the blood will tend to run into his brain. A good way to do this is to raise the foot of the bed or bench on which he is lying. Never raise the head of a shocked person on a pillow. Remember though that these measures are not of importance compared with keeping the shocked person warm.

Stimulants.—They should always be given by the mouth if the shocked person is able to swallow though very likely this will not be the case. The best first-aid stimulant is

aromatic spirits of ammonia. The dose is a half teaspoonful in one-half a glass of water, preferably hot water. The exact amount is not very important, however. That is to say you need not be very particular in measuring it out. A full teaspoonful will not be too much. It may be repeated in half an hour and should be when recovery from shock is not apparent. Other good first-aid stimulants are hot coffee, hot tea, hot beef tea, hot milk or even in the absence of other stimulants hot water. All stimulants taken internally are best given hot, when possible, as aside from the particular stimulant used, heat itself is a powerful stimulant whether used internally or externally. About a cupful of one of these drinks should be given and like the ammonia they should be repeated in half an hour if necessary.

There are also stimulants which act by being inhaled. The best of these are the ordinary water of ammonia, or smelling salts. Very strong ammonia must be diluted with water. These are used, of course, by holding the bottle containing one or another of them under the nose so the fumes will be breathed in. You should allow the shocked person to breathe them in from time to time. Be careful not to spill them on his face as they burn in concentrated solution. The inhaled stimulant is particularly useful for the unconscious person because he is unable to swallow.

It is realized, of course, that accidents often occur under such circumstances, and accidents with severe shock, that it is impossible to do everything which has been described here for the accompanying shock. But at least, you should always do all you can to keep the shocked person warm and to keep him lying down with his head low, if you do this you have done a great deal to help him. No effort should be spared to do the other things recommended, if possible.

Nowhere is a better opportunity given to study shock than in war. The conclusion of our surgeons from their large experience in the world war was that the most important treatment is heat. A very common practice was to raise a litter on a support on each end so that a lamp or oil stove

could be put under it, the blankets carried to the floor retaining the heat.

It was also found that to transport severely shocked men before they recovered from the shock was likely to kill them. The lesson is obvious.

Warning.—While shock is so extremely common in injuries that it should always be kept in mind and treated, it must not be forgotten that something more dangerous even than shock may require attention. The symptoms of severe bleeding are very like shock, and if shock alone is treated in such a case and the bleeding is not stopped the patient may bleed to death.

QUESTIONS

1. What is First Aid to the Injured?
2. Suppose you have to care for an injured person. What would you do first?
3. When should you send for a doctor, or take the injured person to a doctor?
4. What about tight clothing?
5. When would you move an injured person?
6. What are the dangers of moving an injured person?
7. What do you know about giving injured persons water; stimulants?
8. Should clothing always be removed?
9. When would you remove some of the clothing and how would you do this?
10. When does shock occur?
11. What is shock? Cause of shock? Prevention? Symptoms? Treatment? What is a symptom?
12. Suppose you see a person whom you think is severely shocked, what would you look for in order to determine nothing more severe than shock has occurred?
13. Explain the use of heat, stimulants, and position in shock.

PRACTICAL EXERCISES

Have one of the class pretend to be injured, or secure some one else to act as "subject." Members of the class should be required to show just what they would do. They should also be required to loosen and to remove clothing, the place of the injury having been stated. They should place the injured person in the proper position. The pupil of the eye should be demonstrated and each member of the class should be required to take the pulse.

Show on the subject exactly what should be done in shock.

LESSON II

BANDAGES

The first aider must learn to use his hands as well as his head. While clever bandaging is by no means all of First Aid yet it is necessary to know how to bandage well. Practice makes perfect in this as well as in other respects and the first-aid student should learn how to bandage as early as practical in his course of instruction and thereafter take every opportunity to perfect himself by constant practice.

Kinds of Bandages

There are 3 kinds of bandages: Triangular, Roller and Four-tailed.

There are 3 materials for bandages: Gauze, Muslin and Flannel.

There are 3 purposes for which bandages are used: To keep dressings and splints in place; to stop bleeding by pressure; and as slings.

1. **Triangular Bandage.**—The triangular bandage is best suited for general first-aid work, as it can be easily made anywhere, is not difficult to apply as a temporary dressing and is not likely to be put on so tightly that it will cause injury by stopping the circulation of the blood.

The triangular bandage is commonly made from unbleached muslin, though any strong cloth will answer. Bed sheets, pillow cases, napkins and handkerchiefs may all be used to make it.

It is desirable that the piece of cloth for the bandage be not less than 34 to 38 inches square. It is folded diagonally and is cut across in the fold; of course this will give two triangular bandages. While made triangular bandages may be readily bought, the only advantage they possess is

that most of them have pictures showing methods of application stamped upon them.

The triangular bandage may be applied in two ways:

Unfolded.
Folded.

Unfolded means that the bandage is used in the form of the whole triangle.

To fold, the point of the triangle is brought to the middle of the opposite side, and then the bandage is folded lengthwise to the width desired. When folded so as to make a narrow strip the bandage is called a cravat.

2. **Roller Bandage.**—Many good First Aid authorities do not believe in teaching the first aider the use of the roller bandage. What is said on this subject may therefore be omitted if deemed desirable. On the other hand, it has been thought best to include a few words on the roller bandage here so that the student in case he is sometimes compelled to use it, will not be wholly at sea on the principles governing the application. Moreover, while harder to learn, for a few purposes the roller bandage can be substituted for the triangular bandage to some advantage.

Roller bandages are usually made of muslin, flannel, gauze or cheese cloth, and they may be improvised by tearing strips from the sheet and rolling them up. By far the best material is gauze or cheese cloth. This is elastic and fits itself well to the part to be bandaged so that bandages made of it are easy to apply and do not have the disadvantages of inelastic bandages of muslin, which in unskilled hands are very apt either to be pulled so tight on one edge that they cut off the circulation, or to be so loose that they will not stay in place.

While roller bandages may usually be readily bought, it is well to know how they should be rolled. One end of the bandage should be turned over for a distance of about 6 inches, this lap should be folded in itself and this process

FIG. 1.—First step. Triangle for hand.

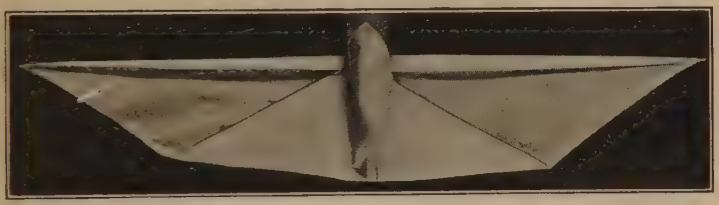


FIG. 2.—Second step. Triangle for hand.

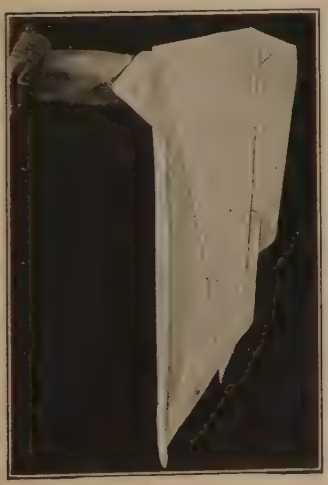


FIG. 3.—Third step.

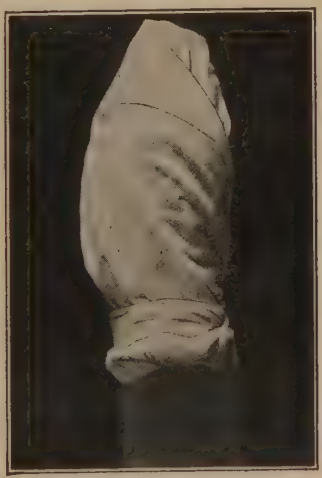


FIG. 4.—Completed bandage.

should be repeated till a small hard roll is formed. Then place the bandage on the thigh (the foot should be on a stool or chair so that the thigh is nearly at right angles to the body) with roll of bandage near the body, length of bandage at bottom of roll and bandage extending down the thigh. Roll, beginning with the fingers of right hand running down to the wrist, and repeat till bandage is completely rolled. The left hand is used to hold the bandage tight and even. The bandage when completed should be in a hard roll with even edges.

Roller bandages are preferably used in the following sizes:

For the finger, ¾ of an inch wide and 1 yard long.

For the arm and head, 2½ inches wide and 4 to 6 yards long.

For the leg and thigh, 3 inches wide and 6 to 8 yards long.

For the chest and abdomen, 4 to 5 inches wide and 8 to 12 yards long.

The bandage 2½ inches wide and 4 to 6 yards long is the most generally used.

While it is not, of course, absolutely necessary to use the bandage best adapted in size for the part to which it is to be applied, it is very difficult to bandage satisfactorily a small part with a wide bandage. Any bandage when rolled may be easily cut through with a sharp knife and thus a bandage of the required width may always be obtained.

The roller bandage is applied by holding the roll in the right hand, the loose end being in the left, and laying the outer side of the end on the place where it is desired to start the bandage.

The simplest method of application is the Circular, but this can be used only when the part to be bandaged is of nearly the same circumference throughout. This is the case with the forearm above the wrist, and with the fingers. In first-aid work, however, the roller bandage is usually applied to hold splints or dressings in place which much extends the field of the circular method of application as, especially with splints, an even circumference is likely to

FIG. 5.—Roller bandage. Spiral reverse for forearm.

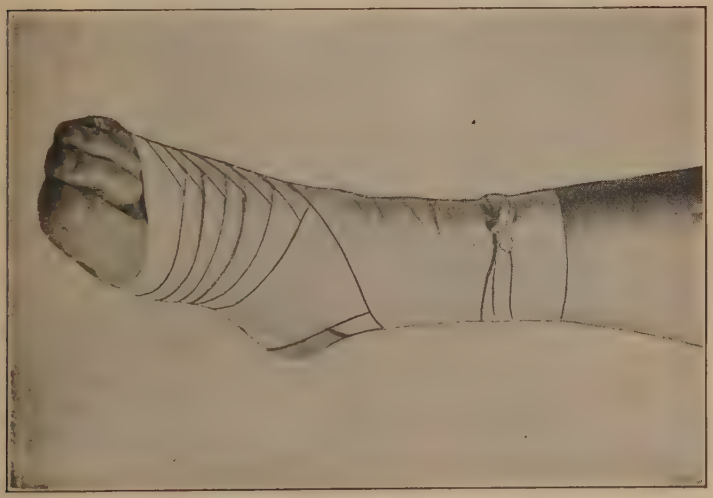


FIG. 6.—Roller bandage. Spiral reverse for ankle.

be presented. The circular method is also more often available with gauze bandages, for on account of their elasticity they adapt themselves to slight pulling much better than do bandages made of stiffer cloth. The circular method of application consists simply of a series of circular

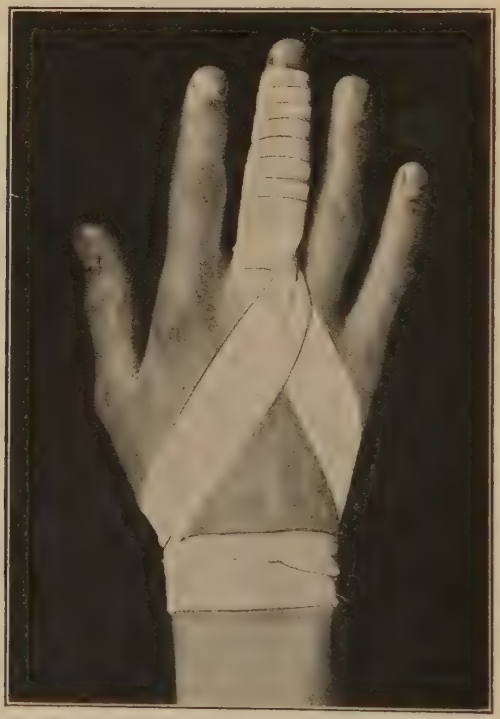


FIG. 7.—Finger bandage using one inch roller bandage.

turns from below upward, each turn overlapping the upper third of the one below.

Where the part is larger at one end than the other, at the start a few turns should be made round and round one over the other, then begin to move up the limb, using the circular method as long as a turn overlaps the preceding one about one-third. It will be found as soon as the limb increases

much in size that if the bandage lies flat, uncovered spaces will be left. To prevent these spaces the Reverse must be employed. The Reverse is generally considered to be the most difficult point to learn in the application of any bandage.

To make the Reverse, place the thumb of the left hand on the lower edge of the bandage to hold it in place, slacken the bandage between the hands (about 3 inches) and turn the roller one-half over toward you. Pass the roller under the limb keeping the lower edge of the bandage parallel with that of the turn below, reverse again at the proper point and so on. The reverses should be made so they lie in the center of the limb or to its outer side and all reverses should be in one line up the limb.

The figure-of-8 bandage is found specially useful about joints. It consists of a series of loops each overlapping the one below by about two-thirds the width of the bandage. The middle part is over the bend of the joint while the loops lie one below the other above it. (See Figs. 8 and 9.)

The spica bandage is a modification of the figure-of-8 bandage, having one loop much larger than the other.

A very valuable exercise in the application of the roller bandage is afforded in bandaging the leg from the foot to include the hip. This gives an opportunity to practice all the methods of application which have been described.

For those unskilled in bandaging lengths may be cut from a roller bandage and these may be tied or pinned in place in the same way that the folded triangular bandage is used.

3. **Four-tailed Bandage.**—This is especially useful for fractures of the lower jaw and injuries of the head. Preferably a piece of cloth 5 to 8 inches wide and from 2 to 3 feet long should be used. It should be doubled on itself and torn from each end until a piece about 4 inches long is left undivided in the middle. The 4-inch roller can be used to make this bandage for the lower jaw; it is rather too narrow for the head. The four-tailed bandage is made from it exactly as described above.

FIG. 8.—A triangular figure-of-8 for knee.

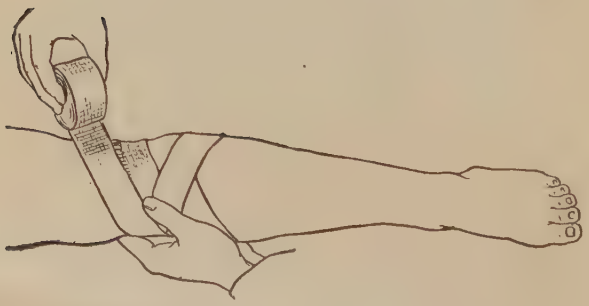


FIG. 9.—Applying a roller figure-of-8 to knee.

How to Fasten Bandages

Triangular and four-tailed bandages are usually completed by tying the ends together securely though they may be pinned, and frequently with triangular bandages flaps are held in place by pinning. The free end of the roller bandage is usually turned over and pinned in place. Other pins are frequently used to hold the different layers of the roller bandage from slipping. A convenient method sometimes employed in securing a roller bandage is to rip the bandage at the end down the center, then to tie a knot to prevent further ripping and carrying the ends around the limb in opposite directions, tie.

Knots should be placed where they do not cause discomfort and where they may be easily reached. If you know the reef knot use it, if not, three knots are quite as secure. Safety pins are better than ordinary pins as they hold better and scratching is prevented.

Precautions

Whatever the bandage used, care must be taken that it is not put on too tightly. It must not be so tight that it constricts at any point, for this will cut off the blood supply, and if the bandage is left in place for some time even so severe an injury as mortification or actual death of the part below may be caused. Pain, swelling and blueness or coldness of the limb below the bandage show that the bandage is too tight and should be loosened or removed.

Always bandage firmly, but never too tightly or loosely.

Always in bandaging a limb, leave the tips of the fingers or of the toes uncovered so that they may be seen.

Always place the part to be bandaged in the position in which it is intended to leave it, as otherwise change of position may result in cutting off the circulation by drawing the bandage too tight at some point.

Never put on a bandage under, but always over a splint.

Always in applying a bandage immediately after an injury remember that there may be swelling and use care in order

that the bandage may not become too tight from this cause; always be ready to remove or to loosen a bandage when such swelling makes it too tight.

Never apply a bandage wet, for as it dries it will shrink and become too tight.

Always bandage from below upward with the roller bandage.

Never reverse the roller bandage over a sharp bone and always use the figure-of-8 over a joint.

Uses of Bandages

Bandages are used:

1. To keep dressings and splints in place.
2. To stop bleeding by pressure.
3. As slings.

Bandages for Splints and Dressings.—When roller bandages are used to hold splints or dressings in place they are wound around and around in the manner already described. For the same purpose cravats are made of triangular bandages. These are simply carried around the splint or dressing and the limb, body or head and are tied in place. The number of cravats is dependent on the length of the splint or dressing.

Bandages to Stop Bleeding.—Most bleeding can be stopped by the pressure exerted by a bandage. For this purpose the bandage whatever the kind used is applied snugly but not too tightly over the dressing covering the bleeding point.

Slings.—1. Arm slings:

Place one end of a triangular bandage over shoulder of uninjured side. Allow length of bandage to hang down in front of chest so that point of triangle will be behind elbow of injured arm. Bend elbow of injured arm to a right angle. This will bring forearm across middle of bandage. Then carry lower end of the bandage over the shoulder of the injured side and tie to the upper end behind the neck.

Bring the point of the bandage at the elbow forward to the front and pin there so that bandage is snug and does not pull.

This makes an excellent arm sling, but even without a bandage a good sling may be made for the arm by pinning the sleeve or the skirt of the coat to the front of the coat. The shirt may be used in the same way.

The cravat may also be used for an arm sling. For this purpose it is employed in the form of a loop which encircles the forearm bent at a right angle and the neck.

Still another arm sling is made from the roller bandage. For this a 3- or 4-inch roller is required, preferably the latter. Bend the forearm on the arm at the angle at which it is desired to hold it; this is usually about a right angle. Put the end of the roller about midway between the forearm and shoulder and hold for a moment to get length required when it may be allowed to drop. But before doing so pass roller in front and under forearm just in front of the elbow. Then carry roller along front of chest to the shoulder on the injured side, over this shoulder to back of neck, in front of sound shoulder, down to make loop for hand, back over sound shoulder, back of neck and in front of shoulder of injured side to starting point where length required will be cut off and the ends tied together. Two loops have of course, been made, one for the forearm near the elbow and the other for the hand.

Application of Triangular Bandages

Head Bandages.—Fold a hem about 1½ inches wide at the long side of the unfolded triangular bandage. Place the bandage so that the hem lies squarely across the forehead just above the eyes and the bandage is over the head with the point hanging down the back. Carry the two ends around the head above the ears cross low down at the back of head and tie them across the forehead. Draw

the point down tight, turn it up and pin it at the top of the head with a safety-pin. This is a useful bandage. (See Fig. 10.)

The four-tailed bandage is also useful as a head bandage. It is applied in three ways. For the front of the head the center of the bandage is placed on the forehead and the ends crossed are tied at the back of the head and under the chin; for the top of the head the center of the bandage is placed there and the ends crossed are tied low at the back and under the chin; for the back, center is put at back of the head and the ends crossed, are tied at forehead and under chin.

Head bandage—front.

Head bandage—back.

FIG. 10.

Eye Bandage.—Place the center of the cravat made from the triangular bandage over the injured eye, bring the ends to the back of the head and tie. A strip cut from the roller bandage may be used in the same way. (See Fig. 11.)

Nose Bandage.—Four-tailed. Place center on nose, cross ends, carry one pair below and other above ears and tie both at back of head. (See Fig. 12.)

Jaw Bandage.—For this, two cravats are necessary if made from triangular bandages. Apply the center of the first across the chin in front, upper border to edge of the lower lip, bring the ends to the back of the neck and tie. Place the center of the second cravat under the chin, tie the ends over the top of the head and then tie the four ends at the back of head. (See Figs. 13 and 14.)

FIG. 11.—Improved eye bandage.

FIG. 12.—Bandage for injury of nose.

FIG. 13.—Jaw bandage.

FIG. 14.—Jaw bandage—back.

Note two cravat triangles are used in this bandage.

An excellent bandage for the jaw may also be made from the four-tailed bandage. The center is placed with its middle at the point of the chin and the ends are crossed, one pair being tied at the top of the head and the other at the back of the neck.

Fig. 15.—Bandage for palm of hand.

A single wide cravat may be placed under the chin, with the ends carried to the top of the head and tied there or a length from a roller may be used in the same way.

Neck Bandage.—The center of the cravat of the triangular bandage or of a length from a roller bandage is placed over the injured place and the ends are carried around the neck and tied as convenient. This bandage

may sometimes be improved by the use of a cardboard support which is held firmly in place between the layers of the bandage.

Chest and Shoulder Bandage.—The triangular unfolded is used. The long side is placed horizontally across the chest, the upper end is brought over the shoulder, and the ends are tied at the back.

Chest and Pelvis Bandage.—A wide roller is applied around and around the body. Triangles in the form of cravats may also be used.

Hand Bandages.—The triangular bandage is spread out. The hand is placed on it, palm down, with the fingers toward the point (if desired, the hand may be closed), with the wrist at the long side. (See Figs. 1, 2, 3 and 4). The point is then brought over the back of the hand to the back of the wrist and the two ends are crossed over the wrist and tied.

Bandage for Palm of Hand.—Place the center of the cravat on the palm of the hand cross the ends at the back of the hand and again at the front of the wrist and tie at the back of the wrist. (See Fig. 15.)

Crotch Bandage.—This is the T bandage. It is made from two lengths of a 3-inch roller bandage. To the center of one of these, 1½ yards long is sewed or pinned at right angles to the other, which is 1 yard long. The bandage is applied by placing the long strip around the waist with the short one at the middle of the back. The long strip is then pinned in front and the short strip is brought forward between the legs to join the long one at the center in front where it is pinned.

Foot Bandage.—Spread out triangular bandage. Place foot in center with toes toward point. Raise point over toes to instep in front. Bring both ends forward, cross them over instep and tie them round the ankle. (See Figs. 16 and 17.)

Adhesive Plaster as Bandages

Adhesive plaster is sometimes used by surgeons in place of bandages. That is to say, surgeons sometimes use

FIG. 16.—Triangle bandage for foot.

FIG. 17.—Bandage for instep and ankle.

adhesive plaster to keep dressings and splints in place, to stop bleeding by pressure over a dressing and for special slings. Moreover, adhesive plaster is employed by surgeons to exert pressure over a sprained joint. They never use it, and it should *never be so* used, directly on a wound. The reasons for this will be explained under the subject of wounds.

Adhesive plaster is not needed by the first aider, however for any purpose. For them all its surgical uses are better performed by a bandage. Its disadvantages are that it cannot be improvised, it requires preparation of the skin for application, it will not adhere to the moist surfaces, it may cause injury by too tight application, and it is painful to remove.

QUESTIONS

1. What are the different kinds of bandages?
2. What are the advantages of the triangular bandage for first-aid purposes?
3. What is the size of the triangular bandage?
4. What is the best material for the roller bandage?
5. Sizes of the roller bandage for different parts of the body.
6. What are the spica and the figure-of-8 bandages used for?
7. How would you make a four-tailed bandage?
8. What precautions must be taken in putting on bandages?
9. For what purposes are bandages used?
10. Why should you not use adhesive plaster?

PRACTICAL EXERCISES

Show the different bandages and how the triangular bandage is used, unfolded, folded and as a cravat.

Put bandages on the different parts of the body and show how they are used to keep splints and dressings in place and as slings.

As much practice in bandaging by the class as time permits.

LESSON III

INJURIES IN WHICH THE SKIN IS NOT PIERCED OR BROKEN[1]

Fractures, Dislocations, Sprains, Strains and Bruises

These are the commonest injuries and no one can hope not to suffer from some of them. Of course many bruises and strains are unimportant. Just as wood may break or splinter just so can the hard tissues of the body break or splinter. The softer tissues of the body also have injuries of their own.

Causes.—These injuries are almost always caused by violence in the form of blows or falls, though some of them are due to wrenching the body.

Prevention.—These injuries occur under so many different circumstances that it is impossible to suggest other than the most general means for preventing them. It is safe to say, however, that a great many of them result from carelessness. Especially in dangerous places, people should exercise unusual care to avoid accident.

Printed notices calling attention to the means of avoiding accident should be observed because they are based on experience. *What should you do if you examine a man who has fallen and you find no break in the skin?*

[1] It should be noted here that a distinction is made between injuries in which the skin is not pierced or broken and those in which it is. This is a very important point for, as will be seen later, the latter injuries are subject to the additional danger of infection from germs and their First Aid treatment therefore demands, in addition, special care to prevent this.

Structure and Mechanics of the Body.—The body has both hard and soft parts. The bones are the hard parts and the muscles and the internal organs, such as the heart, lungs, liver, etc., constitute the soft parts.

A question which is frequently asked by first-aid students is whether it is necessary for them to learn the scientific names of the various parts of the body. It is not necessary but it is highly desirable for the first-aid student to learn the few scientific names given in this book. This will enable one when sending for a doctor to tell him much more accurately what part of the body in injured. Besides there is a certain pride in knowing a thing by its right name.

Bones

The bones are hard and firm and together make up the Skeleton. (See Fig. 18.)

The Skeleton

Forms a strong and rigid frame-work for the body.
Supports and carries the soft parts.
Protects vital organs from injury.
Gives attachment to muscles.
Forms joints so that movements are possible.

The body is divided into three parts:

1. **The Head,** made up of the Cranium, a bony case which encloses and protects the brain; and the Face with the eyes, ears, nose and mouth. The only movable bone in the head is the lower jaw.

2. **The Trunk,** which is divided into two parts by a muscular partition—the diaphragm. The upper portion is the Chest, which contains the esophagus or gullet, the lungs, the heart and some large blood-vessels. The lower portion is the Abdomen, in which are found the stomach, liver, kidneys, bladder, the intestines and other organs.

The trunk is formed of several bones which are of interest to the first-aid student.

The Spinal Column, a strong pillar with several curves, is made up of a number of bones called vertebræ with a softer substance called cartilage between them. At its lower end, the spinal column terminates in the broad Sacrum or Rump bone and the pointed Coccyx. The spinal column supports the head and the ribs, and is itself supported on the pelvis.

The Ribs, 24 in number, form the greater part of the walls of the chest. All the ribs are connected to the spinal column behind, but the two lower ones on each side are shorter than the others and are not connected to anything in front. The 10 upper ones on each side are united to the Breast-bone.

The Breast-bone or Sternum is a flat, dagger-shaped bone which forms the front of the chest. Above it forms joints with the Collar-bones, or Clavicles, being notched for the purpose on each side.

3. **The Upper and the Lower Limbs.**—Each upper limb is made up of the Scapula or Shoulder-blade, a flat, triangular bone at the back of the shoulder; the Clavicle or Collar-bone, a curved long bone placed horizontally across the upper part of the chest above the first rib; the Humerus, the bone of the upper arm; the Radius and the Ulna, the two bones of the forearm; and the Hand, which has 8 small, irregular bones in the Carpus or wrist, five Metacarpal Bones for the hand itself, and 14 bones, Phalanges, in the fingers and thumb.

At the upper part of the lower limbs is the Pelvis a wide, strong, bony basin formed of the Hip bones at the front and sides and partly behind where it is closed by the sacrum and coccyx. It supports the trunk and forms joints with the Femurs.

Below the Pelvis each lower limb is made up of the Femur or Thigh-bone; the Patella or Knee-cap; the Tibia and Fibula, the two leg bones; and the Foot. The foot is made up of the Tarsus, with seven irregular bones, which form the heel, part of the ankle, and the instep, 5 Metatarsal

Bones for the middle of the foot; and the toes with 14 bones, Phalanges.

You will note that the upper and the lower limbs have similar bones.

The principal interest which bones have for the student of FIRST AID is that they may be broken or fractured, one of the commonest serious accidents.

Joints

Wherever two or more bones are in contact, or touch each other, they form a joint. The ends of bones forming a joint are covered with a smooth substance called cartilage or gristle, so that they may move without friction on each other. Joints are enclosed by a flexible sac, the capsule, which keeps out air and which secretes an oily fluid. This fluid lubricates the joints of the body just as oil lubricates the joints of an engine. The ligaments of a joint are strong, fibrous bands which hold the bones together. The most important joints to study are (*a*) the hip and the shoulder, which are examples of ball-and-socket joints since they permit of movements in all directions, and (*b*) the elbow, wrist, knee and ankle, which are examples of hinge joints since they permit of only to and fro movement.

Joints are of importance to the student, as bones are liable to be put out of place or dislocated at the joints.

Muscles

The movements of bones at the joints are caused by the Muscles, of which there are about 400. (See Fig. 19.)

The muscles, the flesh or meat, form two-fifths of the body by weight. They are made up of red fibers which have the power of shortening or contracting, so that if one end of a muscle is fixed and the muscle is contracted the other end will pull on and move whatever it is attached to. By doing this muscles cause all the movements of the body. For example, the biceps, the big muscle at the front of the upper

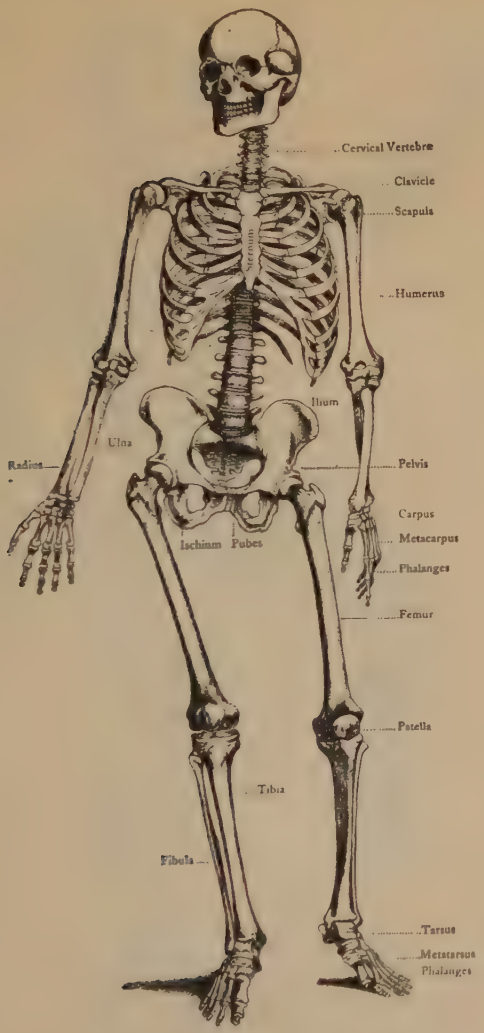


FIG. 18.—The skeleton. (*Holden.*)

FIG. 19.—The muscles. (*Brubaker.*)

arm, in contracting causes the elbow-joint to bend by bringing the forearm closer to the upper arm. All muscles are somewhat on the stretch, as otherwise prompt movement would be impossible. Some of the muscles are attached to bones by Tendons or Sinews. These are strong, fibrous cords called gristle in meat. They may be well seen in the wrist.

Muscles are of great interest both in fractures and in dislocations, as their pulling causes displacements and their resistance offers the chief obstacle to setting fractures and to reducing dislocations.

Subcutaneous Tissue

This name is given to the fatty layer or padding which lies immediately beneath the skin. In it are found many small blood-vessels and nerve endings. The force of a blow or fall is often expended on this tissue and no injury of the deeper structures occurs.

The injuries which will now be spoken of affect the structures of the body which have just been described.

It has already been explained that we are now talking only of injuries in which the skin is not pierced or broken. You would expect to find in this class of injuries a fracture, a dislocation, a sprain, a strain or a bruise.

You must always make sure that you do not overlook the most serious injuries so we will discuss those first.

Fractures

Description.—When a bone is broken, the injury is called a fracture. (See Fig. 20.) Our bones are brittle and when the force used against them is sufficient they break much as would a dry stick. This may be illustrated by wrapping a stick in a roll of cloth and breaking it. Fractures are among the commonest severe injuries, ten times as common as dislocations. About two-thirds of all fractures are of the bones of the limbs. Next in frequency are those of the collar-bone

and ribs. Fractures of the skull, spine and pelvis are comparatively rare.

There are two kinds of fractures: simple and compound.

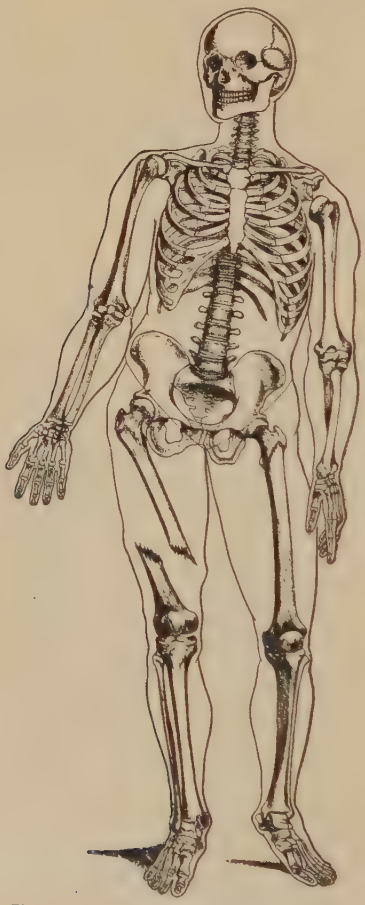


FIG. 20.—Dislocation and fracture.

A simple fracture is one in which the skin is not pierced.

A compound fracture is one in which the skin is pierced. As a compound fracture is primarily of importance because

it is a wound it will be discussed at length under that heading.

Causes.—(*a*) Simple fracture is due to blows and falls. (*b*) Compound fracture is usually due to blows and falls but may be due to bad handling of a simple fracture so that the end of the fractured bone is forced through the skin. A fracture due to a bullet is of course a compound fracture, the bullet piercing the skin and breaking the bone.

Prevention.—Simple: the prevention of blows and falls. Compound: also—by proper handling of simple fractures.

Symptoms. Simple Fracture.—The injured person has had a blow or fall. (*a*) Pain at point of fracture. (*b*) Tenderness at point of fracture. (*c*) Limitation of motion of injured part. (*d*) Deformity of part so it is altered in shape and shortened or bent. Always compare with the uninjured side. (*e*) An inequality may often be felt by running finger along a broken bone. (*f*) On moving a limb in which a bone is fractured, instead of the bone being moved as a whole it will be noticed that at the point of fracture there is unusual movement something like that of a hinge. (*g*) Crepitus. This is the surgical term applied to the grating which is heard or felt when the broken ends of bone rub on each other. (*h*) Shock.

Warning.—One may do great harm by moving a broken bone, for the broken ends are apt to be very sharp and they may cut or tear the soft structures and even break through the skin, thus producing a compound fracture. If an injured person is unable to move a limb, and it seems probable that a fracture has occurred, it is much safer to conclude that it is a fracture without further examination, and to so treat it.

Treatment. Simple Fracture.—Send for a doctor. Treat shock.

The object of the treatment before the doctor's arrival is to prevent more injury, especially puncture of the skin by the sharp, knife-like edges of the broken bone. If this occurs the simple fracture is, of course, converted into a compound fracture. A simple fracture usually heals

painlessly within a few weeks. But a compound fracture (see Figs. 21 and 22) is often accompanied by the formation of pus or matter and such a wound means months of suffering and perhaps death. In the treatment of simple fractures your principal object is accomplished by preventing movement of the ends of the broken bone.

Fig. 21.

If the doctor may be expected to arrive promptly, nothing need be done except to put the injured person in a comfortable position. If it is evident that in order to do this the broken bone will be moved, it must be supported firmly by your hands. One hand should support the broken bone on each side of the break. The bone must not bend at the break.

Fig. 22.

Afterwards the broken bone had best be supported in the natural position on a pillow or a folded coat. In so supporting it great care must be taken that it is not bent or does not drag on the point of fracture.

The proper treatment for any fracture is to set it. What does this mean? A fracture is set by putting the bone in the position it occupied before the break occurred. When a bone is broken or fractured, which is, of course, the same

thing, the force which causes the fracture separates the broken ends. If you break a stick exactly the same thing occurs though in a bone fracture there is another factor. The muscles which are attached to the broken bone on each side of the break, being on the stretch, also pull it apart at the break. Exactly the same thing would occur if you had rubber bands attached to the two ends of a stick you break. In setting a fracture, therefore, you cannot put it in place easily but have to overcome the resistance of the muscles. This requires considerable force and as explained elsewhere, one may do great harm in exerting sufficient force to put the bone in place, for the sharp ends of the broken bone cut like a knife and as they are hidden from our sight we cannot guard against this. For these reasons it is far safer for the first aider not to set the fracture but to fix it in place just as it is by padded splints held on by bandages. If it is thus fixed firmly no further harm will be done. What has been said does not mean, however, that the limb involved cannot be gently straightened before the splint is put on.

You can't find out whether a fracture has occurred through the clothing. Therefore, you must gently remove it sufficiently to get at the place where the bone is apparently broken. Never try to undress the injured man. Cut the clothing in the seam with a sharp knife or scissors, then turn in well back out of the way. Later, turned back again into position, you may use it for padding under the splint if you have no better material for this purpose.

Symptoms. Coumpound Fracture.—Besides the symptoms of all fracture which have already been described, there is a wound leading down to the broken bone, or the broken end of the bone sticks through the skin. These fractures will be discussed under wounds which they truly are and very serious wounds.

Warning.—Never in any fracture attempt to transport the injured person until the broken bone is firmly held in position by splints.

More about Splints.—Splints are used for fractures and suspected fractures. Their purpose is to prevent movement at the point where a bone is broken. They must, therefore, be made of a stiff material. While they must make the limb rigid they must not injure soft parts through too much pressure. For first-aid purposes splints must generally be improvised from something which may easily be procured on the spot. Such articles are pieces of wood, broom handles, lathes, rules, squares, wire netting, heavy cardboard, umbrellas, canes, pick handles, spades, rolls made of blankets or cloth, pillows alone or with pieces of board outside, rifles, swords and bayonets. With a broken leg it is possible to use the other leg as a splint. For bandages for splints see chapter on bandaging. All that is required in this respect is to hold the splints firmly in place but not to make them tighter than this so as to cut off the circulation of the blood.

In improvising splints a few precautions should be observed. Besides being rigid enough to prevent movement at the point where a bone is broken, they should be long enough to prevent movement at the nearest joints, as this will move the broken bone, and they should preferably be as wide as the limb to which they are applied, as otherwise the bandages holding them on will press on the limb as well as on the splint and thus cause pain and perhaps displace the ends of the broken bone. Splints should be well padded on the inner side with some soft material. Because the injured part may swell and press against the edge of the splint. The clothing may sometimes be made to answer this purpose fairly well. Substances generally used are cotton batting, waste, tow, flannel, pieces of cloth, grass, etc. If splints are not well padded, the limb must be watched with special care because the swelling is even more likely to make the splints too tight and this will cut off circulation and may cause death of the part. But, on account of the same danger, every splinted limb must be watched and the bandage must be loosened for swelling or severe pain.

Special fractures

Fracture of Upper Arm or Forearm

Symptoms.—These fractures may almost always be easily detected by the symptoms already given.

Treatment.—Send for doctor. Treat shock. Leave the limb as it is or very gently straighten it. Secure two splints long enough, in upper arm to extend from shoulder and arm-pit to elbow, and in forearm from elbow to tips of fingers. These are best flat boards; shingles are excellent, but the splints may be of any stiff material, such as twigs, tin troughs, etc. Pad splints well. In upper arm, apply one splint to inner and the other to outer side of arm. Support forearm by sling. In forearm: Place forearm across the chest, thumb up. Apply one padded splint—clothing will do for padding—to outer side from elbow to beyond wrist and the other to inner surface extending to tips of fingers. Support by sling. (See Figs. 23 and 24.)

Broken Wrist

This is an extremely common injury resulting from a fall on the hands which are put out in falling forward to prevent the body from striking the ground.

Symptoms.—This commonly is the kind of fracture to which the name impaction is given. The force of the injury actually drives one bone into the other so that they are held together and this is called impacted. Great deformity, no crepitus, movement, etc. (See Fig. 25.)

Treatment.—Send for doctor. Treat shock. Do not attempt to free bones, but leave them as they are. Otherwise treat like fracture of forearm. If not impacted the treatment is exactly the same as for fracture of the forearm.

Broken Fingers

Symptoms.—Usual symptoms of fracture.

Treatment.—Gently draw into natural position; there is little danger of doing further damage here but if you can't

FIG. 23.—First aid dressing. Fracture upper arm.

FIG. 24.—First aid dressing. Fracture at or near elbow.

FIG. 25.—First aid dressing for fracture of wrist or forearm.

easily put in position leave as it is. Put narrow padded splint under finger and hold it in place with a narrow bandage. Support hand in sling. Show to doctor as early as practicable.

Crushed Hand or Foot

Symptoms.—Are usually due to a heavy weight falling on or passing over the hand or foot. Many or few of the bones

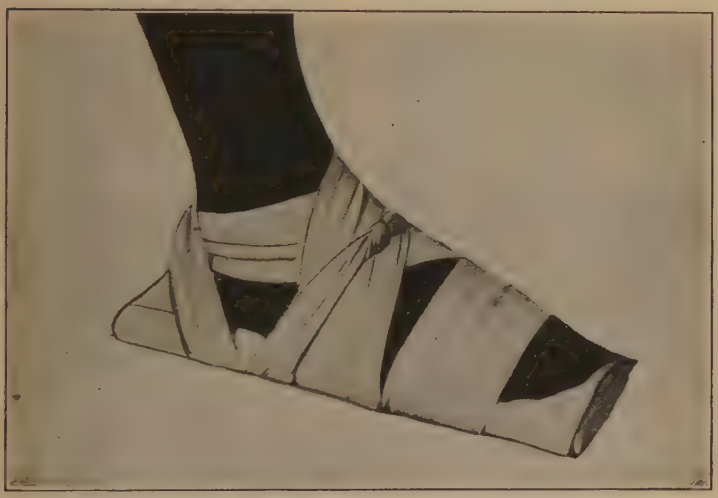


Fig. 26.—First aid splint for dressing crushed foot.

of the wrist and hand or of the foot and ankle, may be crushed. Usual symptoms of fracture. Much pain. Great swelling.

Treatment.—Hand: Apply a padded splint to the front of the hand. This should be as wide as the hand and long enough to go from the middle of the forearm to beyond the tips of the fingers. Bandage carefully in place.

Foot: Remove shoe. Padded splint, bottom of foot from heel to toes. A figure-of-8 bandage will be found most convenient to hold this in place. (See Fig. 26.)

A doctor should be secured promptly for either of these fractures. Raising hand or foot will relieve pain. Shock is likely to be severe and to require immediate treatment.

Fracture of Lower Leg

Symptoms.—As given above. Patient falls to ground. Is not usually difficult to detect fracture.

Treatment.—Send for doctor. Treat shock. Secure pillow, sack stuffed like pillow with hay, straw or the like or a blanket rolled so as to make trough. Gently lift the leg to pillow, or on to the trough of the blanket, placing one hand above and the other below break, under leg, always holding in natural position. Then should not allow toes to turn in or out, but should be supported in same position as toes of uninjured leg. Nothing further unless must move patient. If this must be done the leg should be splinted. Use two splints when procurable. Though any stiff material may be used for these splints, preferably they should be of thin boards long enough to extend from the heel to above the knee so as to prevent movement at the knee-joint, and wider than the leg is thick. The splints may be applied outside of pillow, one at the inner and the other at outer side of leg. The splints should be held in place by 3 or 4 triangular bandages in the form of cravats, or 3 or 4 strips of cloth, straps or handkerchiefs passed around splints, and leg then tied. Care must be taken that none of these strips is directly over break, as this will cause intense pain by pressure. The pillow alone makes a fairly good support even without splints. Splints also may be used without a pillow. If this is done the clothing, straw, hay, cotton, leaves or something else soft must be used for padding under the splints, which are tied in place in the way described above. In case of emergency anything stiff of sufficient length, such as a cane, umbrella or the like, may be used for the outer splint, the other leg being used for the inner splint. The strips of cloth or handkerchiefs are then

FIG. 27.—First aid dressing. Fracture lower leg.

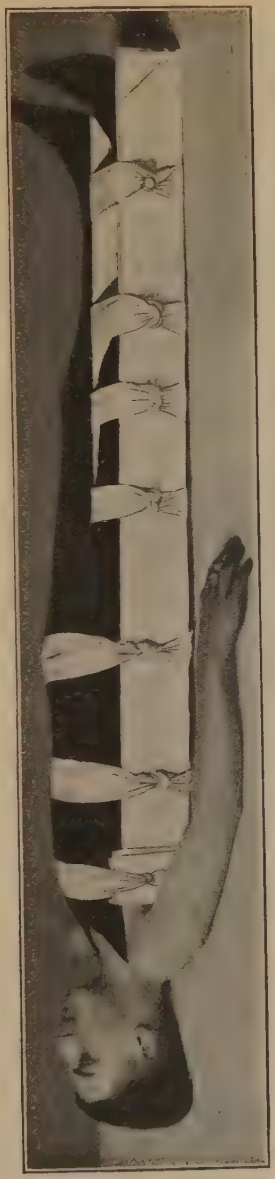


FIG. 28.—First aid dressing. Fracture thigh.

Fig. 29.—First aid dressing for fracture knee cap.

passed around the splint and both legs and tied as before. (See Fig. 27.)

Fractures of Thigh

Symptoms.—As above, patient falls to ground. May be difficult to detect on account of thick muscles.

Treatment.—The necessity of promptly procuring a physician and of treating shock are greater than in fracture of the leg. Remarks in reference to careful handling of broken bone in fracture of the lower leg, apply. If difficult to detect fracture, treat as fracture.

A long splint extending in a solid piece from foot to arm-pit is required for outside splint to prevent movement of hip-joint. This should be firmly fixed by encircling cravat bandages or strips of cloth to the chest as well as to the limb. Seven cravats or strips will be required. The body should not be moved in putting the body cravats or cloth strips in place and this can be prevented by a clever trick. If a stick is used to push the body cravats under the hollow of the back they may subsequently be pulled in place without disturbing the body at all. Inner splint had best extend from crotch to foot. If no inner splint can be obtained, tie legs and thighs together. (See Fig. 28.)

Broken Knee-cap

Symptoms.—As above, patient falls to ground and cannot raise leg. Not difficult to detect fracture, as can feel groove in knee-cap immediately beneath the skin.

Treatment.—Services of a physician will be required and shock generally demands treatment. Must also use care in moving leg.

Straighten leg. Secure splint long enough to extend from middle of thigh to middle of lower leg. Preferably, this should be a thin board as wide as thigh, but a cane, umbrella or the like may be used in case of emergency. Make pad for splint, apply splint to back of thigh and leg with middle opposite bend of knee and tie in place with cravats, strips of cloth or handkerchiefs. Be careful not to put bandage over break but one strip immediately above and one immediately below knee. (See Fig. 29.)

Fracture of Collar-bone

Symptoms.—Patient supports elbow of injured side with hand of other side. Is unable to raise arm above shoulder. Is easy to feel depression by running finger over injured collar-bone.

Treatment.—Send for doctor. Treat shock.

Make pad from a large handkerchief, two medium-sized handkerchiefs, a triangular bandage or the like. Place this pad in arm-pit of injured side. Put arm in sling with hand on opposite shoulder. A triangular bandage may be used for this sling, though a roller bandage is commonly used. Take a roller bandage about 3 inches wide, put this horizontally around body and injured arm at elbow. It will, of course, encircle both the elbow, the bent arm and the body. When tied, by pulling elbow to body it will force upper end of humerous outward, and thus prevent broken ends of collar-bone from overlapping. If triangular bandages are used: Make pad, place hand high on opposite shoulder, a "Gutter" sling of one triangular bandage to

Fig. 30.

hold in this position, tie this triangle at the back, fold a second triangle twice, place center over elbow, pass ends around the body and tie. (See Fig. 30.)

Another method:

Have patient lie down and place his injured shoulder on pillow in a comfortable position till doctor arrives.

Fracture of Ribs

Symptoms.—Sharp pain on taking a long breath or coughing. Breathing is usually short, injured man often presses hand to side to prevent movement of chest.

May feel grating of ends of broken bones on each other by placing hand on chest at point where pain is most severe.

Treatment.—Tie a large handkerchief or triangular bandages firmly around the chest, pin a large towel snugly around chest or apply a roller bandage to chest. These limit chest motion and thus diminish pain.

If shock is severe, call doctor immediately. If not, after bandage is in place must visit a doctor as soon as practicable. Treat shock. (See Fig. 31.)

Fracture of Skull

Symptoms.—Injured person is probably unconscious from injury to brain. If at base of skull, there will probably be a discharge of blood from nose, ears or mouth. If at top of skull, fracture may sometimes easily be felt under skin.

Treatment.—Send for doctor. Place in lying down position with head slightly raised and keep very quiet until doctor arrives. Treat shock but no stimulants unless very weak. Then give aromatic spirits of ammonia. If you are in doubt as to whether the skull has been fractured, assume that it has been and treat the injured person accordingly.

Fracture of Lower Jaw

Symptoms.—Mouth open, man with such a fracture speaks with great difficulty and not plainly. Fracture

FIG. 31.—First aid dressing for fractured ribs.

may often be felt outside, and inside there will be an irregularity of the teeth. May be bleeding from gums. Shock.

Treatment.—Send for doctor. Treat shock.

Gently raise broken jaw and bring lower against upper teeth. Support in this position with the jaw bandage (see Figs. 13 and 14) or with two strips of bandage, one vertical, tied over top of head and the other longer, brought to back of head, crossed and brought horizontally to forehead and tied there.

Broken Back

Symptoms.—Man unable to move. No motion or feeling in body below injury.

Treatment.—Send for doctor at once. Unless necessary do not move injured person before his arrival. Treat shock.

If injured person must be taken from the spot where his injury has occurred, procure ample assistance to lift him. This should be done with the greatest care so as not to bend spine for this will crush spinal cord.

Put stretcher under him and gently lower him to stretcher. (See Fig. 32.)

Fracture of Nose

Symptoms.—Usually not difficult to detect. Pain, swelling, crepitus and deformity. Swelling may be so great that obscures deformity. Is not infrequently compound.

Treatment.—Put in as natural position as possible and hold there with a bandage over nose and around head. Do not pull tight enough to flatten nose. Consult doctor, as there is danger of permanent deformity.

Dislocations

Description.—Dislocations are injuries of joints and are due to the head of a bone slipping out of its socket. A dislocation cannot occur, except in a joint which has

FIG. 32.—First aid dressing for fracture spine. Also used for fracture of pelvis.

FIG. 33.—First aid dressing for dislocation of thigh. Prepared for transportation.

been dislocated before, without tearing the ligaments which keep the bones of the joint close together. Some persons, however, on account of frequent dislocations of the same joint have its ligaments so stretched that not only is dislocation easy, but no further injury of the ligaments results from it. By far the most frequent dislocation is that of the shoulder-joint, which occurs in one-half of all cases of dislocation. But dislocations of the hip-joint, the jaw and the fingers are not particularly uncommon. Dislocations are relatively uncommon as compared with fractures. (See Fig. 33.)

Causes.—Dislocations are usually caused by a blow or a fall but sometimes result from a violent muscular effect, as occasionally is the case with that of the shoulder in throwing a stone.

Symptoms.—Deformity; that is, the joint has an unusual appearance, because the head of the bone is not in its proper place. This may best be seen by comparing the injured with the uninjured side of the body.

The limb in which a joint is dislocated may be either longer or shorter than the uninjured limb. This depends on the direction in which the dislocation has taken place. The head of a dislocated bone may often be felt out of its place. Limited movement as the displaced head of the bone is tightly held in its new position. Pain from pressure by the displaced head of the bone on sensitive nerves. Swelling from bruising of the soft parts by the displaced head of the bone but this is often not noticeable. Shock.

Treatment.—Send for a doctor at once. Treat shock if necessary. Always await the doctor's arrival except in dislocations of the jaw, the fingers, and of the shoulder in very exceptional circumstances, without attempting to put the head of the bone back in its proper place. This is called reducing a dislocation.

Remember that attempts to reduce dislocations, other than those of the finger and jaw, by one without a doctor's training, may result in great harm to the patient, for the

movements necessary to do so may cause serious injury to the blood-vessels, nerves and soft parts.

When no attempt is made to reduce the dislocation, put in a comfortable position and cover the injured joint with cloths wrung out in very hot or very cold water so as to contract the blood-vessels and to prevent swelling as much as possible.

Dislocation of the Lower Jaw

This is not a frequent injury, it may usually be successfully treated by the first aider. This is fortunate, as a dislocated jaw with the open mouth in consequence is most painful and uncomfortable. To reduce a dislocation of the jaw, both thumbs must first be wrapped in several layers of cloth so that they will not be liable to injury. Both thumbs are then placed in the mouth resting on the lower teeth on each side while the fingers seize the lower jaw outside. First pressure is made downward and then backward. As soon as the jaw starts into place the thumbs should be slid off the teeth to the inside of the cheeks or they will be caught between the teeth when the jaw springs into place. The overstretched muscles act just like rubber bands and one must be quick or his thumbs will be injured. When dislocation is reduced put on jaw bandage.

Dislocations of the Fingers

These, not including those of the second joint of the thumb, for which a doctor is required, present no great difficulties to the first aider. The dislocated finger should first be grasped firmly on the hand side. The end of the finger should then be pulled straight out away from the hand and the bone will usually slip into place. No bandage will be required.

Dislocation of the Shoulder

No attempt should be made to reduce this dislocation ordinarily, certainly not if the services of a physician

can be obtained within a reasonable time, say four hours. Make your decision on this point at once for if you are compelled to attempt to reduce the dislocation you must get to work immediately before the muscles have become set and rigid from the irritation caused by the displaced head of the bone.

Frequently little difficulty will be experienced in reducing a dislocation of the shoulder, especially if the joint has been dislocated before. To accomplish it, the patient should be made to lie down flat on his back. The first aider should then sit down by the side of the injured person. He sits on the injured side facing the patient so that his feet are opposite the dislocated shoulder. Next, the first aider takes off his shoe on the foot nearest the patient's body. The stocking foot is then put in the arm pit of the dislocated shoulder so that it will act as a wedge. Now, grasp the dislocated arm firmly and draw it down at the same time dragging it across the body toward the uninjured side, simultaneously pushing outward and upward with the foot in the arm pit. This will usually force the upper end of the dislocated bone outward, and as soon as it is free it will snap back into place. In order to keep the bone in place, the arm should then be bandaged to the side with the forearm carried across the chest and the hand placed on the opposite shoulder.

Warning.—In case any difficulty is experienced in reducing any dislocation, stop at once.

Sprains

Description.—Sprains are injuries of joints. They result from violent stretching, twisting and partial breaking of the ligaments about a point and of the joint capsule and are sometimes accompanied by actual breaking of the bones. The twisting or stretching results in breaking of the blood-vessels and the escape of blood and of blood-serum (the liquid part of the blood) both around and into the joint. Sprains of the wrist and ankle are most common.

Cause.—Not due to a blow but may occur in a fall from unnatural movement of a joint. Sometimes the cause is a slight one, such as twisting the foot by a mis-step or stumble.

Symptoms.—Severe pain immediately. Pain is much increased by movement of the joint. Swelling of joint. Bones are not out of place and appearance of joint is unchanged except for the swelling which may be great. Shock when severe.

Treatment.—Call doctor always when severe or when in doubt. Always begin treatment at once whether doctor has been called or not. Absolute rest in order not to do more damage by rubbing of the injured joint surfaces together. This means that the injured man should not be allowed to move the joint or to step on it. Elevate joint when possible and apply heat or cold. Less blood will come to the injured joint if it is elevated and heat or cold contracts the blood-vessels and thus limits the escape of blood and serum. Cold may be applied in the form of crushed ice in a cloth. It is usually better to use cloths wrung out in very hot or very cold water or to shower the joint with very hot or cold water. Putting sprained joints under a cold or hot water tap is also excellent. Use hot instead of cold water in children and in old people and when much shock.

Either heat or cold should be made use of sufficiently long to get full benefit from it, that is to say, from 24 to 48 hours. At first on the application of either heat or cold, the pain may increase, but after an hour, at the latest, it will commence to improve and will finally disappear. Remember there may be shock and, if so, treat.

Warning.—A severe sprain, especially a sprain of the ankle, is by no means a trivial injury but one which demands the services of a physician.

Strains

Description.—A strain is the name given to the injury produced by overstretching of a muscle. In severe strains small blood-vessels in the muscles are often broken so

that blood escapes into the muscles in the same way that, with a bruise, blood escapes into the subcutaneous tissue. The commonest strains are of the muscles of the back and shoulders and of the small tendons of the wrist and ankle.

Cause.—Strains are not due to a blow though they are often due to a fall from the sudden muscular wrench, not uncommonly those of the back are caused by lifting too heavy a weight.

Symptoms.—Pain in some muscle which is increased on movement. Stiffness. Lameness. More or less swelling. Though when the strain is of a muscle deep in the body this may not be apparent.

Treatment.—Not necessary to call doctor unless severe as in a bad strain of the back. Absolute rest at first. Alcohol and water, arnica or witch hazel gently rubbed in to deaden pain. In both upper and lower limbs, rubbing should always be toward the body. Later such rubbing may be harder to help absorption and to make strained muscles more supple. When pain and stiffness are less, gentle movement should be practiced until both have entirely disappeared.

Bruises

Description.—These are the commonest injuries. When a person falls and strikes some part of his body or when he is struck by something, usually the skin is not broken, but the force of the blow or fall injures the subcutaneous tissue, which lies immediately beneath the skin, breaking numbers of small blood-vessels therein. Blood escapes from these small vessels and this causes the swelling and the ordinary black-and-blue spot which is due to the blood which has escaped.

Causes.—Blows or falls.

Symptoms.—Pain at once from injury to nerves. Swelling from escape of blood from blood-vessels. Black-and-blue spot from same cause. Pain also later from pressure of this blood on sensitive nerves. Pain is increased by movement.

Treatment.—Slight, no treatment. More severe, object is to limit swelling and to decrease pain. At once: ice or very hot or very cold water, or half alcohol and half water. Arnica or witch hazel. These contract the injured blood-vessels and so prevent escape of more blood and also deaden the nerves to some extent, thus relieving pain. Ice may be applied directly to injured part. Best in using liquid remedy to wet cloth with liquid and then to apply cloth. If shock, should use hot and not cold applications; also with children and old people. Raising bruised part diminishes pain, as it diminishes the blood-supply. In arm, when movement is painful use a sling. No doctor is usually required for a bruise.

Warning.—A bruise may be only the least important part of an injury. So with a bruise always try to make sure there is no other injury, such as a broken bone.

Bruises of the chest and abdomen sometimes result in internal injuries. These may be very dangerous from breaking of the blood-vessels of the lungs, of the abdominal organs, or from actual rupture of the soft internal structures. Severe bruises of this character therefore demand the immediate attention of a physician. In case shock is very severe after a bruise of the abdomen or chest, serious injury of the internal organs should be suspected.

Review

How to tell difference between bruises, strains, sprains, dislocations and fractures:

Accident	Tissue involved	Situation	Symptoms
Bruise	Subcutaneous and skin	Any part of body	Pain, tenderness, discoloration, swelling, little disability.
Strain	Muscle	Any muscle	Pain, increased by movement, tenderness, no discoloration, swelling slight or absent, more disability.
Sprain	Joint	Any joint	Pain in joint, tenderness of joint, perhaps discoloration, swelling of joint, considerable disability.
Dislocation	Joint	Any joint	Pain at or near joint, tenderness, no discoloration, deformity of joint, difference of length of limb as compared with opposite side, total disability, any movements resisted.
Fracture	Bone	Any bone	Pain in bone, tenderness especially at one point, discoloration but not usually at once, bone shortened, total disability crepitus, too free movement like hinge at point of break.

QUESTIONS

1. What are the common injuries without a break in the skin?
2. How may such injuries be prevented?
3. Of what is the body composed?
4. What is the skeleton and what does it do as a part of the body?
5. Of what parts is the head made up?
6. Into what two parts is the trunk divided and what does each contain?

7. Describe the spinal column; the ribs; the breast-bone; and the pelvis.

8. Of what bones is the upper limb formed? The lower limb?

9. What is a joint?

10. What movements do joints have? Give an example of a ball-and-socket and of a hinge joint.

11. What are the muscles?

12. What is the purpose of the muscles?

13. What is the importance of muscles in reference to fractures and dislocations?

14. What is the subcutaneous tissue?

15. What is a fracture?

16. What is a simple fracture?

17. What is a compound fracture? Causes of simple fractures and of compound fractures?

18. How would you prevent a simple fracture from becoming a compound one?

19. How would you recognize a simple fracture?

20. How would you treat a simple fracture?

21. What is a splint?

22. From what materials may a splint be made?

23. Precautions in applying splints?

24. Symptoms and treatment of fracture of the upper arm and fore-arm; of wrist; of fingers; crushed hand—foot; of the lower leg; the thigh; of knee-cap; of collar-bone; of ribs; of skull; of lower jaw; of back; of nose.

25. What is a dislocation?

26. How are dislocations caused? Symptoms? Treatment?

27. Under what circumstances would you be justified in trying to reduce a dislocation?

28. When should you proceed to do so?

29. Danger of attempts to reduce dislocation?

30. Describe special treatment for dislocations of the lower jaw, fingers and shoulder.

31. What is a sprain? How is it caused? Symptoms? Treatment?

32. Is a severe sprain a slight injury?

33. What is a strain? How is it caused? What are the symptoms?

34. What is the treatment?

35. Describe bruises.

36. What are the symptoms of bruises?

37. How would you treat them?

38. In a severe bruise what else must you look out for?

39. Tell the difference between a bruise, strain, sprain, dislocation and fracture at the wrist, ankle, hip, shoulder, etc.

PRACTICAL EXERCISES

Show methods of treatment of a simple fracture.

Show application of splints in fracture of upper arm and forearm, wrist; fingers; crushed hand and foot; fracture of lower leg; the thigh; the knee-cap; collar-bone; ribs; skull; lower jaw; back; nose.

Show methods of treatment of dislocations of lower jaw, shoulder and fingers.

Practice in bandaging and the application of splints.

LESSON IV

INJURIES IN WHICH THE SKIN IS PIERCED OR BROKEN—ALL WOUNDS

A man has wounded himself. That is to say, he has had an injury which has resulted in a break in the skin. He is not, however, bleeding severely, so you won't have to think about that. What would you do for him?

As explained elsewhere, injuries in which the skin is pierced or broken are called wounds. As will now be seen, such injuries have certain dangers of their own that other injuries are free from. In order to understand them it is necessary for the first-aid student to know of the protection afforded the body by the skin, and of the action of certain germs on the body.

The Skin

Of course, everybody knows what the skin is. It is the covering of the entire body. The skin is made up of different layers. The outside horny layer protects the body from the entrance of pus germs which are the very small parasites which cause inflammation, matter or pus and blood poisoning. Remember that these pus germs always come from outside the body and if the skin in unbroken they cannot enter it. In consequence any injury in which there is a break in the skin is liable to the additional, and perhaps very great, danger due to pus germs. (See Fig. 34.)

The Germs

The action of pus germs on the body is very important. The wonderful operations which modern surgeons are able to perform are entirely due to their knowledge of how to protect the body from these germs.

Remember that the effects produced by pus germs getting into a wound are not apparent at first. The bad effects only appear later with the growth of the germs and the production of their powerful poisons.

These germs are so small that they can only be seen through a powerful microscope. What they lack in size they make up in numbers and they live outside of the body in countless millions. They do not float around in the air, so there is no danger from them in exposing a wound to the air. Pus germs are found on the surface of our bodies, on knives and on other objects which cause wounds, in the dust of houses, in water, and also on surgical instruments and dressings unless special means have been taken to free them of germs or, in other words, unless they have been disinfected or sterilized.

The Wound

Suppose a wound is received, what happens? If pus germs do not gain entrance to it, there will be no inflammation and it will heal quickly and kindly; but if, on the other hand, the wound is infected by pus germs, this means that inflammation will follow, more or less matter will form, and there will be some absorption of poison from the wound which may result in the more severe forms of blood-poisoning and almost inevitable death. But as pus germs are so generally present, it might appear that under ordinary conditions they would always be carried into a wound when it is received either from the surface of the body or by the object which caused the wound. This is true, but if only a few pus germs are so carried into the body certain cells there will dispose of the germs without trouble and no harm will result; moreover, unless too many pus germs are carried into the body, the blood resulting from the injury will often wash so many out that the cells can dispose of the few left with little difficulty. This is exactly the reason why a wound which bleeds freely is less likely to prove dangerous. We should assume, then, that every wound

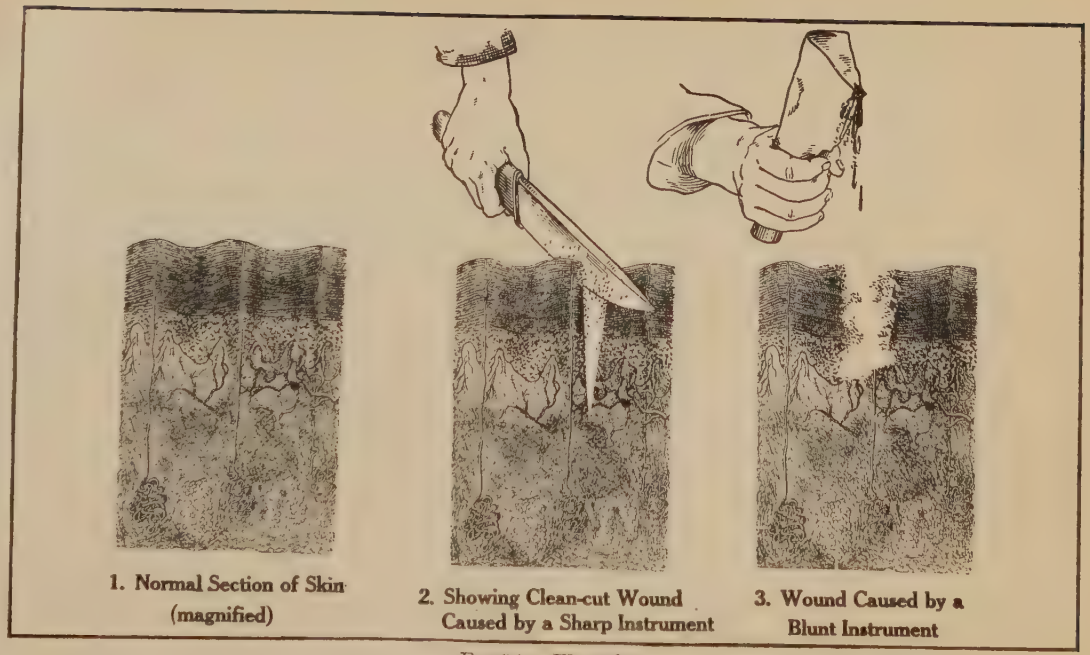

1. Normal Section of Skin (magnified)
2. Showing Clean-cut Wound Caused by a Sharp Instrument
3. Wound Caused by a Blunt Instrument

FIG 34.—Wounds.

DESCRIPTION OF FIG. 34

1. NORMAL SECTION OF SKIN

(Magnified)

Note the upper horny layer. This protects the body from the entrance of pus germs which are the very small parasites which cause inflammation, matter or pus and blood poisoning.

2. WOUND CAUSED BY A SHARP INSTRUMENT

In a wound caused by a sharp instrument, while the protection of the skin is lost, comparatively few germs are carried into the wound. Most of these are washed out by the blood. The very slightly injured cells of the body are able to destroy many others. So such wounds are not as dangerous as ragged, torn wounds. No germs float in the air and there is no danger in exposing wounds to the air.

3. WOUND CAUSED BY A BLUNT INSTRUMENT

With a blunt instrument many more germs are driven in. The bruising of the tissues of the body makes the cells much less able to destroy the germs and bleeding is not so free. So such wounds are much more likely to be followed by inflammation and the formation of pus or matter than are clean cuts. (Note. The germs have not been carried to the deeper parts of the wound.)

is *not* infected with pus germs and must use every care *not* to infect it by our hands, by water, dressings or anything else.

The symptoms of inflammation in a wound are heat, redness, pain, swelling and partial or complete loss of use of the wounded part. These are the signs of wound infection and if these appear in a wound three of four days after an injury, a doctor is always necessary, as they may grow much worse.

While the breaking or piercing of the skin is what distinguishes wounds from other injuries, in all wounds there is also, of course, more or less damage to the parts of the body beneath the skin. As blood-vessels are found practically everywhere in the body they are always injured in a wound and some bleeding results. Usually—in about ninety-nine cases out of a hundred—this bleeding is not severe and may be checked by the pressure of an ordinary wound dressing. In nearly all wounds therefore what we must specially look out for is to prevent germs getting in.

Different Kinds of Wounds.—(1) Cut or incised wounds, in which the skin and underlying tissues are cleanly divided by a sharp instrument. They are caused by razors, sharp knives, glass and the like. In this kind of wound, as blood-vessels are clearly cut across, there is likely to be severe bleeding. They are not so liable to infection as other kinds of wounds. (See Fig. 34.)

2. Torn or lacerated wounds, in which the tissues are torn rather than cut. They are caused by a tearing or crushing injury, such as the blow of a blunt instrument, by machinery or by being run over or struck by an automobile, trolley or railway car. They are common in modern warfare particularly from artillery. With them, as the blood-vessels are crushed as well as the other tissues, severe bleeding is not nearly so likely to occur as in the preceding variety, but on account of the character of the injury, dirt is likely to be ground into the tissues and they are so extensively torn and destroyed that the body cells which kill pus germs are themselves destroyed so infection followed by inflammation

and matter or pus is extremely common. In the World War this was the class of wound in which it was found necessary to get the wounded man into a surgeon's hands at the earliest possible moment. Of course, this is equally true in civil life. The reason is because nowadays surgeons remove the tissues of the body destroyed by the wounding agent. This complicated procedure prevents infection but to do so it must be accomplished within a very few hours. (See Fig. 34.)

3. Punctured wounds are deep wounds of small size produced by sharp-pointed instruments, such as daggers, bayonets and the like. Wounds caused by bullets are also included in this class. Wounds of this variety are, of course, frequently purposely inflicted, but the great majority of bullet wounds in civil life result from carelessness which is almost, if not quite, criminal. "I didn't know it was loaded" is not sufficient excuse for shooting a fellow-being, and if one observes the rule of never pointing a gun or pistol at himself or at anyone else he will have no occasion to make this excuse. The amount of bleeding in this kind of a wound is often slight, but may be great if a large blood-vessel is injured. Infection is common, as pus organisms when carried into such wounds are deeply placed where they are best situated to increase in numbers. With punctured wounds as the injury on the surface is trivial one may regard matters far too lightly. For such wounds a doctor should always be consulted.

Symptoms of Wounds.—The wound itself. Pain. Bleeding. Shock.

Treatment of Ordinary Wounds.—(This refers to the vast majority of wounds in which as previously noted bleeding is slight. For the treatment of severe bleeding see next chapter.) In deep wounds or those which cover a considerable surface, always send for a doctor at once. It is always better to call in a physician if you doubt your ability or resources. Treat shock. In all wounds if necessary cut or rip clothing so as to get a view of the wound. Turn back the clothing so it does not touch

1. Infection by Handling, or Water

2. How to Care For a Wound
A Clean Dressing

Fig. 35.—Wounds.

DESCRIPTION OF FIG. 35

1. INFECTION BY HANDLING OR WATER

If the wound is touched by the hand billions of pus germs will be carried into it. If washed with water even more germs will be carried into the wound and not only that, but the deep parts of the wound which previously no germs had reached will have billions of germs carried to them. *Therefore do not handle or wash a wound.* Even if an antiseptic solution is used it will carry pus germs from the skin and deeper than they have been before and no antiseptic such as bichloride of mercury can be used strong enough to kill these germs, as it will then also destroy the cells of the body and so make them less able to fight the germs. Peroxide is specially dangerous in deep wounds as it carries pus germs everywhere and is not strong enough to destroy them.

2. HOW TO CARE FOR A WOUND

Placing a clean dressing, which means a dressing that has been sterilized surgically (such as the Red Cross Dressing) on the wound will introduce no more germs and will not injure the delicate tissues of the body, exposed in the wound. Moreover, the flow of blood and blood serum (the liquid part of the blood) will be in the direction of the dressing, so the germs will be constantly going out.

This therefore, is the way to take care of a wound.

wound. Do not touch wound yourself or allow the wounded person to touch it. Remember there is no hurry, for air will not infect the wound. If a physician may be expected to arrive within a few moments, it will usually be necessary to do nothing further. Exposure to the air is much safer than the application of anything which is not surgically clean or antiseptic. If, however, you have a surgically clean or antiseptic wound dressing, apply it to the wound at once and bandage firmly into place. This will prevent accidental contamination and will usually stop any bleeding there may be.

Water is dangerous as it contains many pus germs. Strong antiseptics such as bichloride of mercury or carbolic acid will destroy the cells of the body which dispose of the pus germs before they kill the latter and should never be used. Peroxide of hydrogen is not strong enough to kill all germs and in a large or deep wound it washes some of them to uninfected parts which then become infected. Therefore, use none of these things but cover the wound to keep out pus germs.

Does this mean there is no substance, suited for first-aid use, which can be put on a wound so as to disinfect it, that is to say which will kill the germs in a wound? This was true at the time the first edition of this book was published but since that time a very valuable discovery has been made in reference to the use of iodine for this purpose. Painting iodine on wounds is unquestionably of considerable value in preventing their infection. The more promptly it is applied the better. If over two hours are allowed to elapse it is valueless.

Because iodine is valuable, do not forget that it has its limitations. In a very deep wound probably it will not reach the deeper parts and when the body tissues are extensively crushed it will not disinfect them, so as to prevent pus infection. Therefore, it is especially the case that putting iodine on such wounds does not justify you in failing to get a doctor to give treatment you cannot give.

The best iodine solution to use is Lugol's solution, a weak solution of iodine crystals with iodide of potassium in water. The tincture of iodine itself is a seven per cent solution in alcohol and is too strong; it must be diluted with alcohol, one part alcohol to one of tincture. Never use stronger than this half strength

The method of applying iodine to a wound is simply to paint it on freely being careful, so far as possible, to reach all parts of the wound. A camel's hair brush is the best thing to use but a bit of cotton on a stick will do very well. The iodine disinfects the brush so you need have no fear on that score. Do not pour iodine into a wound or cut.

While it burns considerably it may be used on any part of the body except on or near the eyes.

Unfortunately iodine corrodes the cork of a bottle, and its fumes are destructive, especially to metals. This is the reason the army medical department does not issue the solution. They keep the crystals in an hermetically sealed tube only making the solution when required for use. You can do the same thing or you can keep the solution in a bottle changing the cork from time to time. A rubber cork is much to be preferred. Put the bottle somewhere out of the way where it will not be likely to injure anything and so safeguarded that no one is likely to drink it by mistake.

The exact composition of iodine in the tubes used by the army is one gram of iodine and one and one half grams of iodide of potassium. The directions are to dissolve the contents of the tube in 50 c.c. (about an ounce and a half) of water or alcohol.

There is an additional reason for not washing a wound if iodine is used for iodine produces much more irritation of the wet than of the dry skin. Grease seriously hampers the effect of iodine, however, and in very greasy wounds, such as those sometimes caused by machinery, the grease should if possible be dissolved before the iodine is put on. Ordinary gasoline, ether, or turpentine will dissolve this grease. But if you cannot get one of them put on your

first-aid dressing either with or without painting the wound with iodine.

Use iodine if you have it but at the same time do not forget that if you put a surgically clean dressing on a wound without using iodine you have done a greal deal to prevent infection. Nor is it safe to put a surgically dirty dressing on a wound even if iodine is used.

What has been said applies to all *kinds* of wounds and the treatment given is a good one for the little cuts or scratches which are so common. We hear from time to time of some one dying from blood-poisoning as the result of the scratch of a pin, in fact many serious cases of infection occur from little wounds. Inflammation of these slight wounds is not particularly uncommon, however, and this should be prevented if possible. They rarely bleed much and making them bleed so that the blood will wash out the germs is the best thing to do first. Do not suck them as very dangerous pus germs are found in the mouth. Squeeze them well at the sides. If of a finger it is well to encircle the finger near the hand with the thumb and finger of the other hand and then to work down with strong pressure, pushing all the blood in the injured finger ahead of the encircling thumb and finger of your other hand. This is sometimes called milking the finger. After the blood has been squeezed out apply a piece of clean gauze or iodine and gauze which makes an excellent dressing. Collodion may safely be used on a shallow, cleanly cut wound but if the wound becomes inflamed it must be removed as this shows pus germs have been sealed up and are multiplying and producing poison. It should never be used on a more serious wound. The use of adhesive plaster (except court plaster to cover a trivial scrape not involving the entire thickness of the skin) must be absolutely condemned, for not only does plaster seal the wound so any germs within will be in most favorable position to increase in numbers but it is itself likely to be covered with pus germs.

FIG. 36.—Dressing wound top of shoulder. First aid dressings for special wounds.

You will perhaps remember the general examination of plaster made throughout the country when it was thought it had been infected with tetanus by some of our enemies. While little evidence of tetanus germs was then found much of the plaster examined proved to be extremely dirty with many pus germs.

Dressings are needed for nearly all wounds. The only exception to this rule are shallow scrapes of the skin. These, as has just been stated, may be sealed with collodion or covered with court plaster thus obviating the need of a dressing. Iodine, also, may be used for them without a dressing. But whether iodine is used or not more serious wounds require a dressing.

One most important observation respecting wounds of special interest to the first aider was made in the World War. This is that there is a period of from 8 to 12 hours after a wound is received before infection begins. The important lesson to the first aider is that he should get a wounded man to a doctor as soon as possible.

More about Wound Dressings.—A dressing consists of everything which is used to cover or to dress a wound. The pad which is put directly on the wound is called a compress. In ordinary emergency treatment a bandage is put on immediately over the compress and this is all that is necessary. With much bleeding it is better, if you have it, to put a layer of absorbent cotton over the compress and then to bandage. It is important that the compress should not only be large enough to cover the wound but to lap an inch or so on each side. Do not forget that the compress is the most important part of the dressing. It is the inside we are looking after, not the outside and a beautifully applied bandage will not make up for a dirty or poorly applied compress.

When a surgeon says a dressing is sterile he means that it has been made free from all germs. Every material is dirty in the surgical sense if the germs have not been killed. Surgically clean, sterile, or antiseptic dressings

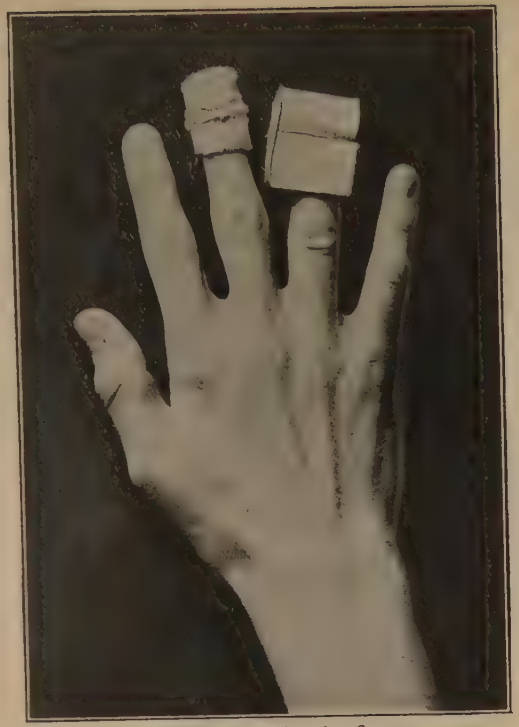


FIG. 37.—Dressing for finger.

FIG. 38.—Dressing for wound, forehead.

First aid dressings for special wounds.

FIG. 39.—Dressing for wound of groin.

FIG. 40.—Dressing for wound of elbow.

First aid dressings for special wounds.

as they are variously called are, of course, the only kind that should be applied to wounds.

The first-aider can make most of the apparatus he requires; in the case of compresses, however, it is better to use only those which have been specially prepared.

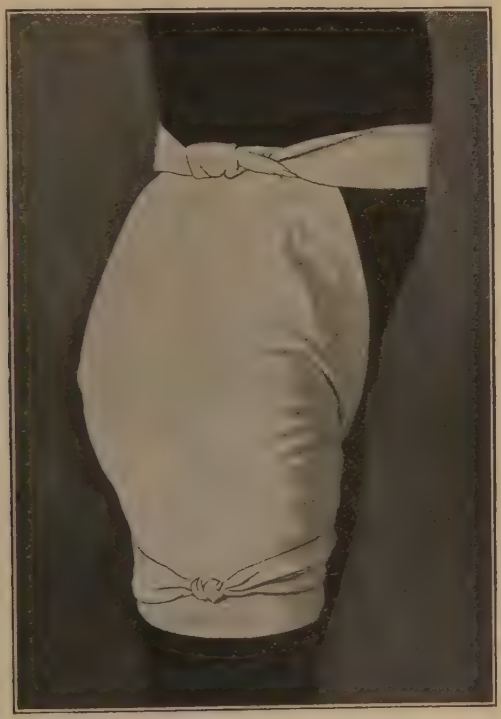


FIG. 41.—Wound of hip. "Spica" made with triangles.

Every dressing that is applied to a wound should meet the following tests: (*a*) all germs which were in or on it were killed at the time it was made, (*b*) it has not been contaminated since it was made (*c*) it will not be contaminated on being applied.

The necessity for having a safe dressing for wounds led to the making of the American Red Cross First-aid Outfits.

In each of these outfits is found a long gauze bandage with a compress or gauze sewn to it in the center, a triangular bandage printed so as to show how to apply it, and two safety-pins.

The directions, which are also found inside the case, are as follows:

"*Gauze Bandage with Compress.*—If there is a wound or any injury in which the skin is broken, this bandage and compress are used by unfolding the bandage, **being careful not to touch the inner surface of the compress.** The compress should then be placed directly on the wound or injury, and held in place by wrapping the ends of the bandage around the limb in opposite directions and tying them or pinning them in place. With a very large wound which the compress will not cover, apply it to the middle of the wound and wrap the bandage around as before. In this case be careful not to touch any surface of the bandage which is placed on the wound. In case there is no wound, this bandage may be used like an ordinary bandage to hold splints in place, etc.

"*Triangular Bandage.*—The triangular bandage may be used as an outer bandage or as a sling in the manner pictured on it. This bandage should also be tied or pinned in place.

"Do not touch an open wound with the fingers, water, or anything except the compress, or when very large the untouched surface of the bandage.[1]

"The pressure of the bandage will stop ordinary bleeding."

The advantages of this outfit are that the contents are always clean and ready for use, the dressing may be easily applied, and not only does it contain a dressing, but also a sling. You can usually obtain splints easily and if you have the outfit at hand you are ready for any ordinary injury.

A number of other first-aid packets are on the market which contain compresses that may be safely applied to a wound, though none is quite so easy to handle without

[1] This should not be held to include iodine.

accidental contamination as the Red Cross outfit. Each has printed directions on the box or container which must be carefully followed.

If a first-aid packet can be procured it should always be used in preference to anything else to dress a wound. The next choice should be sterile or antiseptic gauze. Small packages of such gauze suitable for compresses may be bought in most drug stores, and are found in emergency cases. (Sterile gauze is ordinary gauze in which the germs have been destroyed by heat, and antiseptic gauze is ordinary gauze in which germs have been destroyed by an antiseptic, usually bichloride of mercury.) In a city, therefore, or if an emergency case is available, one may easily procure a safe compress and all he needs do is to handle it so that he will not contaminate it. This may be accomplished by holding it not with the fingers, but by the paper which covers it, allowing only the inner surface of this paper to come in contact with the gauze and never removing part of the paper until it has served this purpose. If, by chance, the gauze is touched by the hand great care should be taken to drop the untouched part on the wound and to place the gauze which has come in contact with the hand as near the outer layer of the compress as possible.

While the size of the gauze compress is dependent on the size of the wound as explained elsewhere the compress should not only be large enough to cover the wound but also to lap over on all sides; certain standard sizes of compresses are most commonly employed. The favorite for general use is a 4″ by 4″ compress though 6″ by 6″, 8″ by 8″, 5″ by 5″ and 4″ by 6″ are all popular. Several layers of gauze are essential to any compress. The Red Cross finger dressings, intended for small wounds only, have proven very useful. Each of these little compresses is protected from contamination by an oil paper wrapping.

As stated, unless a safe gauze can be procured it is much safer to leave a wound exposed to the air than to cover it,

but this will not always prove practical. It is especially in places where no gauze for compresses can be procured that circumstances render it necessary to cover wounds. In such localities it may be hours before the services of a doctor can be procured, so an uncovered wound will be exposed for a long time to accidental contamination, which will be almost inevitable from the hands or clothing of the injured person who must perhaps be moved. Iodine, of course, helps but will not wholly prevent this. A compress, too, affords an excellent means of checking bleeding, being often all that is required for this purpose.

Under such circumstances, therefore, it will be necessary to make a compress which, if not as safe as is desirable, is, at least, as good as can be procured. First, as surgically clean cloth for the compress as can be obtained should be used. This will be found in a towel, a handkerchief or other cloth of the same kind which has recently been laundered and has not been used since it was washed. Preferably, this cloth should be boiled for ten minutes or soaked in a solution of 1–2000 bichloride of mercury, corrosive sublimate, for an equal length of time. (Tablets of corrosive sublimate are in common use; they are known as antiseptic tablets. This substance is a deadly poison and its solution cannot be made in metal vessels.) The process recommended will give a compress which is safe to use, but an important practical difficulty is presented in applying such a compress to a wound. It will, of course, be so wet that it will not be possible to put it on the wound without squeezing some of the water out of it. To do this the compress must necessarily be handled and, as has been explained, pus germs exist in countless millions on the hands.

If possible, the hands must be cleaned surgically, which means they should be freed of germs. This should be done by hard scrubbing for five minutes with hot water, soap and a nailbrush, paying special attention to the nails. Preferably the hands should be washed under a tap instead of in a basin, and if a basin is used the water had best be

changed two or three times. As a further precaution, when corrosive sublimate is procurable, the hands after being washed should be soaked in a 1–1000 solution of that chemical for a period of five minutes. The hands must not be wiped and they must not touch anything except the compress. The piece of cloth which is intended for a compress may now be taken from the vessel in which it has been boiled or disinfected, but in so doing the operator should be very careful not to allow his hands to touch that part of the compress which he intends to put on the wound. On the contrary, he should pick up the piece of cloth by its outer surface and, holding it at all times by this, squeeze the water from it until it is comparatively dry and then put it on the wound without delay. If a fairly large piece is taken for the compress and if, previous to boiling, or disinfection, it is folded so as to fit the wound it will be handled much more easily and safely.

When no facilities are available for washing and disinfecting the hands, this naturally must be omitted, but the same precautions should be taken in handling the compress. Suppose, however, that in addition the compress cannot be boiled or disinfected, and yet it is absolutely necessary to have one. In this case one should again take a towel, handkerchief, etc., which has just been laundered, and without unnecessary handling apply its inner surface to the wound. Towels, handkerchiefs, etc., which have been used or handled, though they may look clean, are never so in the surgical sense and are therefore particularly dangerous to use as compresses.

You will be wise if you keep on hand two or three surgically clean dressings and some iodine.

Special Wounds

Compound Fractures.—As has been explained under the heading fractures, there are two kinds of fractures, simple (closed) and compound (open). It has also been explained

that in a compound fracture, as the skin is pierced, we have a wound to deal with. Moreover, this is today a serious wound, and before it was understood how wounds are infected, one which was very commonly fatal. If you can treat a compound fracture properly you are qualified to give good First Aid treatment to any wound. To do so think of the wound first and make that safe before you treat the fracture.

Treatment. Compound Fracture.—1. Send for doctor.

2. Treat shock.

3. Expose fracture by cutting clothing.

4. Turn back clothing from wound.

5. Always treat wound first, then fracture.

6. Do not touch wound with fingers or anything else.

7. As soon as possible procure an antiseptic or surgically clean compress and place it on the wound.

8. Then use same precautions as in simple fracture to prevent movement of sharp ends of broken bone. (Padding and splints.)

9. If a sharp bone projects through the skin, as frequently happens, do not attempt to restore it to its place, but after dressing wound, hold it in position as it is with splints.

Abdominal Wounds.—While all wounds should be treated on the general principles already described, a word or two is required on the subject of abdominal wounds in which more or less of the abdominal contents escape through a large cut. Send for a doctor at once. Place a clean cloth over the wound and keep it constantly wet with a weak solution of salt and water, for if these delicate structures become dry they will suffer almost fatal damage from this cause alone. Boiled water is the only safe water to use for this purpose but if you cannot boil the water you will have to use the cleanest water available. Treat shock.

Wounds in Which Foreign Bodies Remain.—Such bodies should be gently pulled from the wound in a direction contrary to that in which they entered. If they are of

considerable size and have damaged the tissues a good deal, the wound should be shown to a doctor at the earliest opportunity.

With a splinter of wood, the commonest of such foreign bodies:

Pull the splinter from the wound with a pair of pincers or by putting a knife blade against it and holding it on the blade with the thumb-nail.

The same method may be used with a splinter under the nail. But if it is broken under the nail, scrape the nail thin over it and cut out a small V-shaped piece so as to reach it. Small splinters in the skin may be removed by a needle. In order to avoid possible infection it will be much safer to wash the skin with hot water and soap and to pass the needle through a flame before using it. A better way is to paint the skin with iodine and to sterilize the point of the needle or knife used with iodine.

A wound from which a foreign body has been removed should never be sealed with plaster or collodion.

Eye Wounds, Including Foreign Bodies in the Eye.—The eye is the organ of sight. It is a ball surrounded by three coats. Covering the eyeball in front is a delicate membrane called the conjunctiva. Protection to this membrane is afforded by the eyelids when they are closed, but when they are open it is very liable to injury and to the entrance of foreign bodies. These are commonly spoken of as "something in the eye." On account of the sensitiveness of the conjunctiva, they cause much pain and distress. The eyeball itself is well protected from injury, as it is situated deeply in the head and the brows overhang it. Pointed objects may, however, enter it. When this occurs severe damage almost always results. The symptoms are severe pain and redness of the eye, and if a wound has been inflicted it is usually easy to see the cut. Such injuries should be treated by a doctor.

In any injury of the eyeball, cover both eyes with absorbent cotton or soft cloths, soaked in cool water, so as to

1. Method of inverting eyelid to find foreign body.

FIG. 42.—Foreign body in eye.

keep the eyelids still, and bandage them into place with bandages around the head. Be careful not to put on these bandages so tightly that they will press on the eyeballs, and in order to prevent inflammation keep them constantly wet with cool water until the services of a doctor can be procured. While boiled water is safer for this purpose there is little danger in the use of any clean water.

Splinters in the eye should be pulled out if possible. If they cannot be removed easily, put a few drops of olive or castor oil in the eye; a doctor should be consulted as soon as possible.

Foreign bodies in the eye are usually cinders, sand or particles of dust. They cause a great deal of discomfort and pain, and tears, which, fortunately, often wash them out.

Never rub the eye, as this will be likely to rub the foreign body into its delicate covering.

First, close the eye so that the tears will accumulate and the foreign body will frequently be washed out or into view, so that it may be easily removed. If this fails, pull the upper lid over the lower two or three times, close the nostril on the opposite side with the finger and have the sufferer blow his nose hard.

If the foreign body still remains in the eye, examine first under the lower, then under the upper lid. For the former, have the man look up, press the lower lid down and if the foreign body is seen brush it off with the corner of a clean handkerchief. The upper lid is not so easy to see. Seat man in a chair with his head bent backward. Stand behind him and place the finger or a match on the upper lid one-half inch from its edge. Turn the upper lid up and back and brush off the foreign body as before. A few drops of castor oil in the eye after removing a foreign body will soothe it. (See Fig. 42.)

Above all things do not be rough, or you may do very serious injury. If you experience any difficulty in removing any speck from the eye it is much safer to bandage a

pad wet with clean water on it and to take the patient to a doctor.

Lime in the eye may be neutralized by bathing it with a solution of vinegar, a teaspoonful to a cupful of water. Particles of lime large enough to be seen should be removed like other foreign bodies.

Infected Wounds

Any wound which has matter or pus in it is called an infected wound.

The symptoms of infection in a wound are those of inflammation. They are: (*a*) heat, (*b*) redness, (*c*) swelling, (*d*) pain and (*e*) more or less loss of use of the part affected. That is to say, the skin is hot and red about the wound, there is some swelling, the wound throbs and one cannot use the part of the body where the wound is as well as usual. As explained elsewhere the symptoms do not appear for three or four days after the wound is received, because the pus germs have to have time to multiply and produce their poisons. The best treatment is prevention. Probably everybody has had experience with infected wounds of minor importance in injuries of his hands. Very commonly nowadays one puts iodine on such wounds immediately and this prevents infection. If they are more extensive a dressing will also be required. Suppose, however, you encounter a wound with the symptoms of inflammation in yourself or in some one else. Unless these are trivial you should consult a doctor for they are danger signals.

Poisoned Wounds

This name is given to wounds into which a poison other than pus germs is introduced. Special treatment is necessary in order to remove and combat the effects of these poisons on the body. Snake bite, bites of dogs and cats, lockjaw and stings and bites of insects and spiders will be discussed here.

1. **Snake Bite.**—Snake bites are rare injuries in this country, but bites from certain poisonous snakes are so

rapidly fatal if not promptly given proper attention that it is necessary for the student of First Aid to know how to treat them. The rattlesnake and the moccasin are most generally to be feared in the United States.

Prevention.—When it is impossible to avoid the localities where poisonous snakes are commonly found, prevention comprises the wearing of high boots or leggings by day and sleeping on a cot or raised platform at night instead of on the ground. The Mexican plan when sleeping on the ground of surrounding the sleeper with a hair rope or lariat in a circle is undoubtedly a good one, as snakes will not cross such a rope.

Symptoms.—Great pain in the wound. Rapid swelling. Much depression and weakness, followed promptly by death in some cases unless proper treatment is given.

Treatment.—Immediately encircle the limb with a string, handkerchief or bandage between the bite and the body and tie it tight. This can only be done in the limbs. This cutting off of the return of the blood to the body, of course, prevents absorption of the poison. The wound should then be soaked in hot water if this is obtainable and in any event squeezed, milked, or sucked. This is for the purpose of extracting as much poison as possible. Sucking the wound made by the snakes we have in this country is not dangerous unless one has cuts or scrapes in the mouth. While as stated elsewhere there is danger of infection from sucking an ordinary wound, such danger may be disregarded in a snake bite as it is absolutely essential to extract the snake poison. These procedures should not be delayed for a moment in order to send for a doctor but one should be summoned as soon as possible. The further first-aid treatment consists of burning or cauterizing the wound. For this ammonia and permanganate of potassium are both used. Strong ammonia is required and with both do not be afraid to use freely in strong solution. The patient should also be freely dosed with stimulants. A big dose of aromatic spirits of ammonia should be given at once and

should be repeated as often as seems necessary to keep up the strength. Do not be afraid to give too much, for persons bitten by poisonous snakes require a large amount of stimulants. Or any other stimulant may be given in place of aromatic spirits of ammonia if it can be obtained more promptly.

Loosen a bandage that has been on for an hour because it cuts off the circulation and may cause death of the part. Never try to remove it all at once but loosen it a little so that only a small amount of poison will be carried into the body, then tighten and repeat after a few moments if the sufferer does not seem to be greatly affected by the poison. In this way you may finally be able to remove the constricting band entirely. But, on the other hand, if the poison which escapes into the body causes serious depression you must keep the bitten part tied off and take chances on its dying. Fortunately most snake bites are on the limbs so you can tie them off in the way described. You cannot tie off the head, face or body; so with snake bites of these parts you must omit this, but do not fail to do the other things recommended.

2. **Dog and Cat Bites.**—The teeth of a dog, and to a less extent those of a cat, make a rather nasty lacerated wound. These are treated like all other similar wounds unless the biting animal is rabid or is suspected of being rabid. Rabies is, of course, the same as hydrophobia. Cows, horses, wolves, foxes and deer also have hydrophobia.

The first thing to do for such a bite is exactly that for snake bite: tying off, hot water and squeezing to encourage bleeding, and then burning. A red hot wire may be used for burning the wound as well as strong ammonia or nitric acid. Lunar caustic, though so commonly used, is not of much value.

As soon as the bite has been cauterized, remove the constricting band and dress like any wound. Treat shock.

When possible it is best to have a doctor see such bites at once. But in any event you should never neglect consulting

him as early as practical on account of the dangers of hydrophobia, which is a terrible disease that may be easily prevented but is never cured.

3. **Lockjaw.**—The scientific name for this is tetanus. It is due to a special germ like a pus germ which does not show its presence in the wound at once. The point to be remembered is, however, that lockjaw can be prevented by proper treatment but is almost never cured. Lockjaw develops particularly in ragged torn wounds into which dirt or manure has been ground and sometimes in wounds due to rusty nails. Wounds from toy pistols, wounds from fulminate, or so-called dynamite caps, explosion wounds and burns from fireworks; also wounds caused in handling wires, and wire cables in telephone, electric light, and logging operations, frequently cause lockjaw. It is much safer to have a doctor see such wounds as soon as possible.

4. **Stings and Bites of Insects and Spiders.**—These are rarely dangerous to life, though they may cause a great deal of discomfort. Ammonia should be immediately applied to the part where the sting entered; the sting should be removed if it remains in the wound. Afterward cool, wet dressings should be used. Cloths wet with water in which a very few drops of carbolic acid have been thoroughly mixed, and wet salt, are good applications.

QUESTIONS

1. What is a wound?
2. What is the special danger to be feared in a wound?
3. How does the skin protect the body?
4. What is the difference in the effect produced on the body by a mechanical or a chemical cause and by germs?
5. How can a germ enter the body?
6. Where are the germs found?
7. What does disinfection mean?
8. What happens in a wound if germs gain entrance to it? If they do not gain entrance to it?
9. How does free bleeding diminish the danger of wound infection?
10. What is inflammation?
11. What is blood-poisoning?

12. How would you prevent pus germs entering a wound?
13. What are the symptoms of inflammation in a wound?
14. When do they come on and what should you do if they appear?
15. What are the varieties of wounds?
16. What are the symptoms of wounds?
17. How would you treat an ordinary wound?
18. Why should one try to make a trivial wound bleed?
19. What dressing would you prefer to use for a wound?
20. How would you prepare a wound dressing?
21. State what you know of the use of: Strong antiseptics; peroxide of hydrogen; collodion; plaster; iodine.
22. What is the treatment for an abdominal wound?
23. What do you understand by foreign body?
24. How would you treat a wound in which there is a foreign body?
25. How do you treat an eye wound?
26. How would you remove a speck from the eye?
27. What are the dangers in removing foreign bodies from the eye?
28. What are poisoned wounds? What are infected wounds?
29. What would you do for a snake bite?
30. What is hydrophobia and how is it caused?
31. What is lockjaw? How is it prevented?
32. What is the treatment of bites and stings?

PRACTICAL EXERCISES

1. Show wound dressings and their methods of application.
2. Have each member of the class put on such a dressing in such a way that neither the dressing nor the wound is contaminated.
3. Show how iodine is used.
4. Show how to treat a snake bite.
5. Show the way to remove a foreign body from the eye.

LESSON V

BLEEDING

What should you do when you see a person bleeding freely from a cut received from a sharp instrument? Now you must not get the idea every time there is an accident in which the skin is pierced or broken (such injuries are commonly called wounds) that there is going to be serious bleeding which requires prompt treatment on your part. As a matter of fact, while there is always some bleeding in wounds, in 99 out of a hundred, exposure to the air or the pressure of the ordinary wound dressing is all that is necessary to stop bleeding. On the other hand, in the one out of a hundred wounds in which there is dangerous bleeding, you have got to stop it and stop it quickly or the man will bleed to death. In order that you may know how to stop severe bleeding it is necessary to know something of the heart and the blood-vessels, of the course of the blood and of the blood itself, and these will now all be described.

The Heart.—The heart is a muscular pump which forces the blood, by way of certain blood-vessels, to all the tissues of the body, even to the most remote parts.

The heart is about the size of a man's fist and is located in the chest between the lungs. It is a hollow, muscular organ, which is provided with valves that close and prevent the blood from flowing backward, so that all the force of the heart may be expended in sending the blood forward. The beat of the heart which we feel in the chest is its contraction by which it is made smaller inside, thus forcing the blood to the furthest parts of the body. After the heart contracts it dilates or becomes larger inside and its valves open so that it may fill with blood. The next contraction

again forces the blood forward, and so on as long as a person is alive. Its action may be compared to the bulb of an atomizer.

The heart contracts usually about 72 times per minute.

While, as has just been stated, the heart is a pump, it is not a single but a double pump, being divided into two entirely separate halves by a muscular partition. The left side of the heart or the left pump, drives the blood through the body, back to the right side, and the right side drives it through the lungs alone and then to the left side.

Blood-vessels.—A series of closed tubes, or blood-vessels, as they are called, carry the circulating blood. They are of three classes: 1, Arteries; 2, Capillaries, and 3, Veins.

1. **Arteries.**—Leaving the left side of the heart is the largest artery in the body—the Aorta. This strong tube is just about large enough so that a man's thumb may be introduced into it when it is separated from the heart. It soon divides into branches which again branch and re-branch, the individual branches constantly growing smaller in size, to reach finally furthest parts of the body. It should be remembered, too, that the smaller branches of the arteries join freely with one another. The blood passes from the heart to the aorta and thence to the smaller arteries, not in a steady stream but in waves, each of which is produced by a contraction of the heart. The beat of these waves causes the Pulse, which may be felt not only at the wrist and temple, but also anywhere else an artery is near enough the surface of the body. Naturally, if an artery is cut, there will not be a steady stream flowing from it, but the blood will be expelled in spurts or jets. Arteries, especially those of large size, tend to remain open when divided.

In dealing with a cut artery it is necessary to recall that in such a blood-vessel the flow of blood is away from the heart and consequently to stop the bleeding it is necessary to apply pressure between the cut and the heart, or on the bleeding point itself. Pressure on the further side of the cut will, as may be easily understood, do

absolutely no good so far as stopping bleeding from an artery is concerned. It is also best to press on the artery on the near or heart side as close to the bleeding point as possible. This is because arteries in their branching and rebranching join each other, and if pressure is made on any artery far above the bleeding point, so many branches may bring blood into it between the point of pressure and the bleeding point that a great deal of blood will be lost, notwithstanding the fact that the main branch is blocked by pressure at a distant point. However, it is not in every part of the body that arteries lie near enough to the surface to be compressed in their course. Moreover, it is necessary in compressing an artery to select a point where a nearby bone gives a hard surface to press against. Therefore, the student of first aid must know, first the situation and course of the principal arteries and, second, the points on which pressure will be effective.

The aorta has three great branches which are of particular interest. One of these, the Carotid, supplies the head and neck with blood; the second, the Subclavian, the upper limbs; the third, the Femoral, the lower limbs.

The table which follows gives certain necessary information regarding these arteries and their branches.

Arterial bleeding is always more serious than other kinds of bleeding because blood is rapidly lost being forced from the open artery with every beat of the heart. The blood spurts from an artery and is always bright red in color.

2. **Capillaries.**—The arteries, as we go farther and farther from the heart, become smaller and thinner-walled, till they finally end in still smaller blood-vessels which are called capillaries, from the Latin word meaning a hair. This name is given on account of their small size. The capillaries form a delicate network of vessels everywhere in the body, and give the rosy color to the skin, best seen in the pink under the finger nails and in the red of the lips. Slight pressure on the skin will cause a white spot to appear. This is because the pressure has forced the blood from the net-work

Artery	Course	Point on which to make pressure
Carotid	From upper, outer edge of breast-bone to angle of jaw.	Deep. Down and back, an inch to the outer side of Adam's apple.
Temporal (a branch of carotid).	Upward, one half inch in front of ear.	On skull, immediately in front of upper part of ear.
	Upper Extremity	
Subclavian	Across the middle of first rib to arm pit.	Deep. Down and back over center of collar-bone on first rib. Shoulder should be drawn down first.
Brachial (a continuation of the subclavian).	Descends along inner side of big muscle at front of upper arm; about line of seam of coat, to just below center of crease at bend of elbow.	Against bone of upper arm by grasping and pulling big muscle to outer side. Or at elbow by putting a tight roll of cloth or a rolled bandage in bend of elbow, and bending up arm as much as possible.
	Lower Extremity	
Femoral	Down thigh from pelvis to knee, line from middle of line between point of hip and center of pelvis in front to inner side of knee.	Against bone of thigh high up inner side in line given about three inches below upper end of line.
Popliteal (a continuation of the femoral).	Down in middle of space at the back of knee-joint.	In bend of knee as described for elbow.

of capillaries and the white skin is seen instead of the rosy color due to the presence of the blood in the capillaries. In capillaries the pulse, or contraction wave from the heart, is no longer apparent, as these fine, hair-like tubes break up

the waves. Slight cuts or pricks of the skin always divide some capillaries and therefore cause bleeding. Naturally, on account of the minute size of these vessels bleeding from

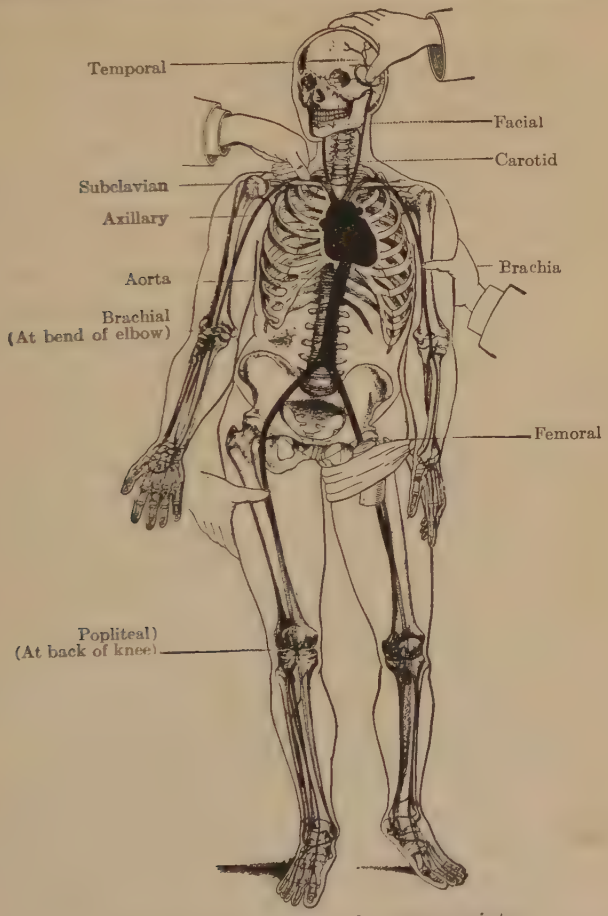


FIG. 43.—The arteries and pressure points.

them, except from a very large surface is not dangerous to life. Capillaries branch so freely that pressure used to check capillary bleeding, to be effective, must be made on the bleeding point.

The blood lost from capillaries is no longer bright red in color like that from arteries, but is somewhat darker.

3. **Veins.**—The blood-vessels which return the blood to the heart from the points farthest from it are called veins. They may be easily recognized as the blue lines under the skin. Capillaries unite to form small veins, these unite to form larger veins, and finally the veins become very large before entering the right side of the heart. The best known of the large veins are probably the jugular veins of the neck. The jugular veins are often divided in attempts at suicide by cutting the throat.

Bleeding from a cut vein is in continuous flow instead of in jets as is the case with bleeding from arteries, and it is mainly through this difference that one distinguishes it from bleeding from an artery. Venous blood, too, is dark, bluish-red in color, as the oxygen in the blood has been lost in its passage through the capillaries. While bleeding from veins has not the almost terrifying appearance of arterial bleeding, a dangerous amount of blood may be lost from a large vein. As the course of the blood in the veins is toward the heart, in stopping bleeding from them pressure must never be made on the side toward the heart, but on the bleeding point or on the side away from the heart.

The Blood.—The blood is a circulating fluid which carries properly prepared food, oxygen, and heat to feed and warm all parts of the body, from which it also removes waste materials for final expulsion. These processes go on constantly as long as life lasts. Coagulation or clotting is the property of the blood which is of most interest to the student of first aid. While the blood is circulating in the living vessels it remains fluid, but as soon as this influence is removed it coagulates or clots, that is to say thickens, thus tending to stop bleeding. It is easy to see if Nature did not provide this safe-guard that the slightest scratch sufficient to draw blood would result in the loss of all the blood in the body. The rate of loss would be regulated simply by the size of the opening just as is that of water flowing

from a pipe. Very rarely a person is found whose blood does not clot. These people are called "bleeders," and they often bleed to death from a trivial injury, such as the pulling of a tooth.

All efforts to stop bleeding have as their object to make the blood clot so that the clots will plug the bleeding vessels. Therefore, we must know the best way to help the clots to form. In order to clot, blood must be at comparative rest. A spouting stream of blood will never clot. This is one reason why bleeding from arteries is particularly dangerous. As soon as we stop the bleeding and hence the movement of the blood it begins to clot but not before. This is like water, standing water will freeze but running water will not. Any foreign material, especially if it has many points on which clots may form, will help in the formation of clots. Surgical gauze is a good example of such a material. Cobwebs are also, and they were much used even by surgeons before the danger of dirt in a wound was so well understood. Now their use would be regarded as criminal.

Symptoms from Loss of Blood.—Of course, save in an internal hemorrhage you will see the blood. Besides the actual appearance of blood in hemorrhage, hemorrhage and bleeding mean the same thing. The loss of a considerable amount of blood gives rise to certain symptoms: Faintness, with cold skin, pale face, dilated pupils, feeble, irregular breathing, sighing, weak pulse, dizziness and loss of consciousness. The severity of the symptoms depends on how much and how rapidly blood is lost

Treatment of Wounds with Severe Bleeding.—Check the bleeding. Put the injured person in such a position that he will be least affected by the loss of blood. This is lying down with the head low so that the brain will get as much blood as possible. Do nothing which will increase bleeding. Violent movements must be prevented. When once the bleeding has ceased the injured person should remain quiet, as any movement may dislodge the clot and start it again. See that he gets plenty of good air, cover him warmly

and put hot bottles around him if they can be obtained. Stimulants increase the force of the heart, so they are undesirable; but sometimes the injured person becomes so weak that it is absolutely necessary to give them to prevent him from dying. Whenever possible, always avoid doing so until the bleeding has been checked by some mechanical means. One-half teaspoonful of aromatic spirits of ammonia in half a glass of water is a good stimulant. Any other stimulant may be used if it can be obtained more quickly.

When a patient is in a state of collapse from loss of blood his death may often be prevented by forcing the blood into the body from the limbs. This is done by raising the feet and bandaging the legs from the toes to the body and by bandaging the arms from the tips of the fingers to the armpits. Roller bandages are required for this purpose.

In order to check bleeding it is necessary to know from which kind of blood-vessel it comes.

1. Arterial hemorrhage is recognized by a bright red blood expelled in jets. The blood is lost very rapidly.

2. Venous hemorrhage is recognized by a steady flow of dark blue blood.

3. Capillary hemorrhage is characterized by the oozing of blood of a brick color.

Bleeding will not be severe except from arteries and large veins.

Naturally, as arteries, capillaries and veins may all be cut in a wound, there may be bleeding from all three. In this case arterial hemorrhage demands first consideration, and with venous and capillary hemorrhage the latter may be disregarded for the time being.

Bleeding from Arteries

Treatment.—Send for a doctor at once. Do not wait for him for by so doing the patient may die or be in a hopeless condition when he arrives. Cut off clothing at once so as to see bleeding point but in very severe bleeding take the next

step before doing this. Press with your fingers or thumb on the artery between the bleeding point and the heart. This stops the bleeding just as you can check the water flowing from a hose by pressure in any part of its length. (It is like stepping on a small garden hose; the bone representing the ground, the artery the hose and the pressure from the fingers corresponding to the pressure of the foot.) It does more than this, however, Nature's method of checking hemorrhage is by the formation of a clot, and as pressure prevents the movement of the blood beyond the point of pressure an opportunity is thus given for a clot to form.

The points where pressure can best be made on arteries in their course have already been given, but it will be best to say a few words more on this subject.

Bleeding from any part of the scalp may be stopped by a tight bandage around the head. This bandage should encircle the head, going across the forehead just above the ears to the back of the head behind.

Bleeding from the side of the head above may also be stopped by pressure on the temporal artery in front of the ear just above where the lower jaw may be felt working in its socket.

All arterial bleeding from the head except that already referred to and from the upper part of the neck had best be checked by pressure on the carotid artery. To make such pressure press backward with the thumb or fingers deeply into the neck just to the inner side of the plainly seen muscle which reaches from the upper part of the breast bone to behind the ear.

Wounds of the neck whether from arteries or veins are so immediately and extremely dangerous, however, that for them direct pressure on the bleeding point should be resorted to at once.

In bleeding from wounds of the shoulder or arm-pit, the subclavian artery may be reached by pressing the thumb deeply into the hollow just above and behind the center of the collar bone.

In bleeding from any part of the arm or hand, the brachial artery is usually pressed outward against the bone just behind the inner border of the large muscle of the upper arm. This artery runs about with the seam of the coat. (See Figs. 44, 45, 46 and 47.)

Another method, when bleeding is below the elbow, is to put a firm pad of gauze or cloth about the size of a small egg at the bend of the elbow, to close the joint tight and to bandage in this position.

For the hand alone, pressure on the pulse at the outer side of the wrist and at the same place at the inner side will stop bleeding. Two little pads may be used for this.

While bleeding in the palm may be checked in these ways, direct pressure by means of a stone wrapped in gauze or the like firmly bandaged in the palm with a hand closed upon it is much better.

In bleeding from the thigh, leg or foot, press backward with the thumbs at the middle of the groin where the femoral artery passes over the bone. This is four finger breadths below the fold of the groin.

For bleeding below the knee, a pad about the size of a billiard ball is placed in the bend of the knee, the joint is bent on it and is bandaged in this position just as is done in the elbow-joint.

In making pressure with the fingers, if you feel the beat of the artery, you may be quite sure that with a little care to get it between your fingers and the hard point underneath you can check the bleeding. If you have stopped the bleeding in the manner just described, you may also be quite sure that the patient is safe so long as you continued the pressure.

You will hardly be able to do this for more than ten or fifteen minutes, however, as your fingers will become tired and cramped. It will be best, therefore, in wounds of the extremities (of course no tourniquet can be put around the neck) to have a tourniquet made to place around the limb against your fingers with the pad on the artery;

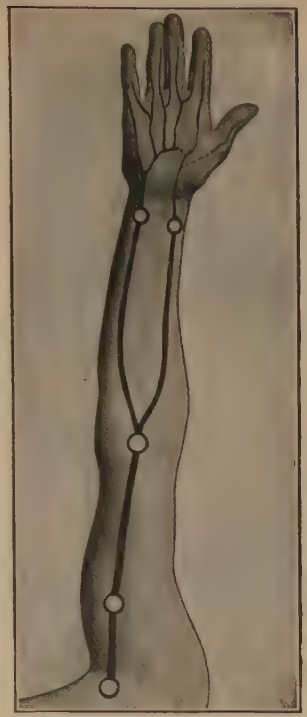


FIG. 44.—Course of arteries in the arm and pressure points.

FIG. 45.—Course of arteries head and neck with pressure points.

Fig. 46.

Fig. 47.

Course of arteries in the leg and pressure points with front view and back view.

the tourniquet then to be twisted, or in proper cases the elbow or knee pads may be used in place of the tourniquet. In severe abdominal bleeding a coat or pillow should be crowded down on the abdomen.

One of these methods, the tourniquet or pad, will usually be all that is necessary if the services of a doctor can be procured within two or three hours. If this is not the case you will be in a serious position. If either apparatus is left in place much longer than this there is considerable danger from cutting off the blood-supply that you will cause the death of the part below. This because no part of the body can do without blood for a long period. Yet if the pressure is removed the bleeding may recommence. Under such circumstances, therefore, leave the tourniquet or pad in position as long as you dare, say two hours. In the meantime procure an antiseptic compress or have one prepared in the manner described elsewhere. Place this gently on the wound and bandage firmly in place so as to make strong pressure on the bleeding point. The pressure between the heart and the wound may now be gradually released. If the bleeding does not recommence, well and good; if it does, the tourniquet or pad must be reapplied. Another attempt to remove it should not be made for at least an hour, as time is needed for the clot to reform.

Suppose, at first, and this is not wholly improbable, that you have failed to stop the bleeding by pressure between the heart and the bleeding point—there is still no reason why you should become panic stricken. Of course you do not want to put your fingers in the wound as this will be very likely to infect it, but in case of a severe arterial hemorrhage which you are unable to check by pressure between the heart and the bleeding point you must at once make pressure on the cut artery in the wound. If you have an antiseptic compress or a surgically clean cloth to put over your fingers, which are used to make direct pressure, so much the better, as this will prevent infection; but do not wait to obtain

it. When direct pressure is made in this way, it should be replaced, if possible, by a compress held in place by a bandage.

With wounds of the smaller arteries if a compress is firmly bandaged on the wound at the beginning it will often be all that is required to check bleeding. Position is also of value in stopping such hemorrhage. By elevating the arm or leg the heart is made to pump against gravity and a much better chance is given for a clot to form which will block the injured artery.

More about Tourniquets.—Tourniquets are instruments used to stop bleeding from arteries. Every tourniquet must have a strap to go around the limb, a pad to place on the artery and some means by which the pad may be made to press on the artery and thus to stop the flow of blood. In an improvised tourniquet, which is the type most commonly used, the strap may be made of a handkerchief, towel, bandage or cravat, and a smooth round stone, a cork or some object of similar shape and size may be used for the pad. The stone, or the like, had best be wrapped in a small piece of cloth so that it will not bruise the skin too much. It is then placed over the artery above the wound and the strap is best passed twice around the limb and tied loosely at its outer side. A stick is introduced between the two layers thus formed and is twisted around until the bleeding is stopped. If desired, another bandage may be used to loop over and to hold the end of the stick from twisting back and so relieving the pressure of the pad on the artery. (See Fig. 49.)

One layer of bandage may be used for the strap if more is not procurable. In order to avoid bruising the skin and muscles in using this it is best after introducing the stick in the loop to twist away from the body.

The inner tube of a bicycle tire makes an excellent tourniquet. Its end is used for a pad.

Ready made tourniquets with straps, buckles, and pads may be bought. They are more convenient to use. (See Fig. 48.)

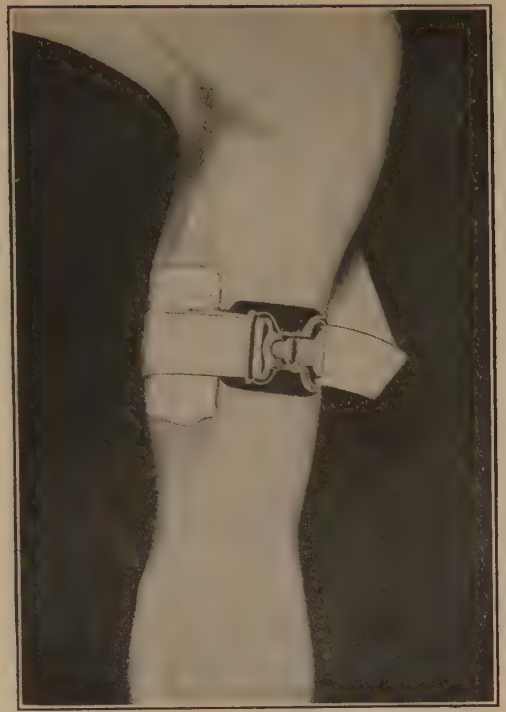


FIG. 48.—U. S. Army tourniquet (web strap and spring buckle) applied.

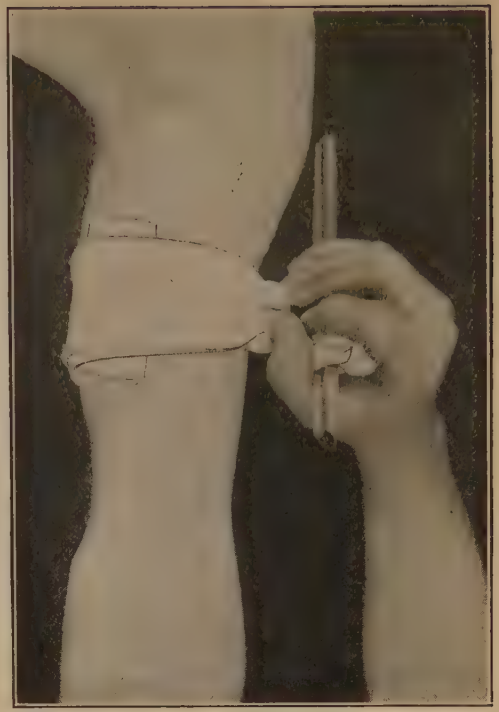


FIG. 49.—Improvised tourniquet applied to upper arm.

Besides the bruising of the muscles and skin which is certain to occur to some extent with any tourniquet, there is a much graver danger connected with their use. This, as has been explained, is due to the fact that in consequence of cutting off the circulation of the blood, mortification and death of the part of the limb below may follow. Therefore, tourniquets should never be used except when necessary and they should be removed as soon as possible. In doing this loosen the tourniquet and allow it to remain loose if no bleeding occurs. It should not be removed as it may be necessary to tighten it again quickly should bleeding recommence.

Never cover over a tourniquet with a dressing. To do so may conceal it so you or someone else may not realize it is being used.

There is one other important thing to remember about tourniquets. They are only used in two places, on the brachial artery in the upper arm and on the femoral artery high up on the thigh. Though it would theoretically be better to get nearer the bleeding point for arteries cut low down in the arm or leg as a matter of fact it is not possible to do so with a tourniquet as there is no lower place where a tourniquet can be successfully applied.

The dangers of tourniquets were demonstrated in the World's War as they always are in war. Their use is now still more carefully safeguarded.

Instead of tourniquets, appliances to make pressure on the whole circumference of a limb and thus to stop bleeding are sometimes employed. A special elastic bandage and elastic suspenders have been recommended. They are much safer than a rope which is sometimes brutally used. When possible, however, use the tourniquet, as cutting off the whole circulation by pressure on the entire circumference of the limb is much more likely to cause mortification than the tourniquet which only exerts hard pressure on the artery alone. If circular constriction is used it should never be employed for over an hour.

Bleeding from Veins

(Large Veins)

Treatment.—Stopping bleeding of this character is rather simple as compared with checking bleeding from arteries. Send for a doctor. Remove any bands such as tight collars, belts, garters and clothing which prevent the return flow of blood to the heart. If a limb be wounded, elevate it so as to assist the flow of blood back to the heart.

Apply a compress directly to wound and bandage on tightly. If no compress can be obtained which is surgically clean or antiseptic, if bleeding is very severe it will be necessary to make direct pressure in the wound with the fingers. This will, of course, be done at the risk of infecting the wound. If possible, keep wounded part in an elevated position for some hours after bleeding has stopped.

With wounds of the neck, such as those caused in an attempt to cut the throat, some of the jugular veins are often divided. It is quite probable in such a case that death will occur before anything can be done. If not, jam the finger on the bleeding point at once and replace them with a compress at your leisure. This compress should be bandaged tightly in place. But be careful not to cut off the breathing.

Varicose Veins are veins which have become very large from weakening of their walls. Only those of the legs need be considered here. They may burst from injury or without an injury, causing serious or even fatal hemorrhage if they are not given prompt attention.

Send for a doctor at once. Put bleeding man on his back. Remove all bands around leg above bleeding point. Raise leg. Cut and rip clothing so as to get at bleeding point. Turn back clothing from wound.

Place surgically clean or antiseptic compress on bleeding point and bandage firmly in position, or when absolutely necessary use fingers first for direct pressure on the bleeding point and replace them by a compress. Keep the man lying down for some hours with leg elevated.

If there has been considerable loss of blood, cover him warmly and place hot bottles around him. Give stimulants only when absolutely necessary to prevent death, as they will increase the force of the heart and so the bleeding.

Bleeding from Capillaries

As has already been explained this is the kind of bleeding which occurs in every wound and which is not dangerous to life. It is unimportant whether the blood comes from capillaries or small veins, nor can one tell this. Nothing is needed to stop this kind of bleeding except exposure to the air. Then a wound dressing should be put on. The pressure from this will stop any slight bleeding which continues. A tourniquet should never be used for such bleeding and as previously explained pressure should be made solely on the bleeding point or points.

Internal Hemorrhage

May result either from a deep wound which cuts a large blood-vessel of one of the internal organs or from the bursting of a blood-vessel of the lungs or stomach.

Symptoms.—Those of hemorrhage, but as the bleeding is internal it will not be seen.

Treatment.—Send for a doctor at once. Put patient in a lying-down position immediately with his head lower than his body. Apply ice or cloths wrung out in very cold water to the point from which you think the bleeding comes. To distinguish between bleeding from the lungs and stomach, remember that from the former the blood is bright red and frothy and is coughed up, while from the latter it is dark and is vomited. Give stimulants only when bleeding man is becoming weak.

Nose-bleed

Usually this does not result from a wound, but comes on spontaneously. Slight nose-bleed does not require treatment, as no harm will result from it.

Treatment. Severe.—Place patient in a chair with his head hanging backward. Loosen collar and anything tight around the neck. Apply cold to the back of the neck by means of a key or of a cloth wrung out in cold water.

Put a roll of paper under the upper lip, between it and the gum. If bleeding does not cease, salt and water, a teaspoonful of salt to a cupful of water, should be snuffed up the nose.

If bleeding still continues, send for a doctor to come at once. Before his arrival place a small piece of cotton or gauze in the nostril from which the blood comes and shove it in gently for about 1 inch. A pencil answers very well to push this plug in.

Pinching the soft part of the nose below the bone will also help to stop bleeding.

Stimulants should be used only as in the other classes of hemorrhage.

QUESTIONS

1. What is the purpose of the heart? Describe its action.
2. What is the heart beat and how often does it occur?
3. What are the different classes of blood-vessels? Describe each.
4. What are the characteristics of bleeding from an artery?
5. In bleeding from an artery where would you press, and why?
6. Where would you press to stop arterial bleeding from the scalp, the side of the head above, the lower part of the head and the neck, the shoulder or arm-pit, the arm or hand, the palm of the hand, the thigh, leg or foot? Tell exactly what you would do to stop bleeding from a large artery.
7. What are the characteristics of bleeding from capillaries?
8. How would you stop bleeding from capillaries, and why?
9. What are the characteristics of bleeding from veins?
10. How would you stop bleeding from veins?
11. What is the blood? What does it do?
12. Describe clotting of the blood?
13. What helps to make the blood clot?
14. What are the symptoms of great loss of blood?
15. What is a tourniquet? What are its uses and dangers? Where would you put it on?
16. How would you treat bleeding from a varicose vein?

17. Treatment of internal hemorrhage?
18. Difference between bleeding from the lungs and stomach?
19. Treatment of nose-bleed?

PRACTICAL EXERCISES

1. Show the course of the arteries on the subject and the pressure points.
2. Show how a tourniquet is used.
3. Have each member of the class show how to stop severe bleeding from an artery or a large vein.

LESSON VI

INJURIES DUE TO HEAT AND COLD

Burns and Scalds; Sunstroke and Heat Exhaustion; Frost Bite and Freezing

Extreme heat and cold cause body injuries of a special kind What should you do for such injuries?

Burns and Scalds

Description.—Burns are due to dry heat, such as a fire, while scalds are produced by moist heat in the form of hot water, steam, etc. With either, the injury may be confined to the skin alone or it may extend deeper. With burns all the tissues of the body may be charred down to the bone and with scalds all the tissues may be actually cooked. With either the danger, which first of all is shock, will depend upon the depth, extent and part injured as well as on the age of the injured person.

In children and old people, burns and scalds are particularly dangerous. Both burns and scalds of the throat and windpipe often cause death, as the swelling of the injured part is likely to result in suffocation. You know the danger of breathing in flames.

Causes.—Burns: Flames or fires, hot or molten metal, the electric current, explosions of gas or gunpowder, and strong acids and alkalies.

Scalds: Steam, boiling water or hot oil.

Prevention.—The prevention of burns and scalds is rather a complicated subject, as it involves: (1) Prevention of fires. (2) Putting out fires. (3) Rescue of persons at fires. (4)

Extinguishing burning clothing. (5) Avoidance of danger from hot or molten metal. (5) Avoidance of electric shock; and (7) Methods to prevent explosions of gas and gun-powder. (8) Care in handling strong acids and alkalies.

Prevention of Fires

Most fires result from carelessness. It would seem as though very few people would be foolish enough to take chances in this respect but hundreds of fires are caused yearly by lack of common sense. Throwing matches in paper baskets is not safe. Hot ashes in wooden boxes is a common cause of fires. Clothing hung too close to stoves often catches fire as soon as it dries. Fireplaces unguarded with screens frequently cause fires from burning cinders which snap out on carpets or rugs. Burning lamps under shelves is one of the commonest causes of fires. Defective wiring results in the loss of many homes. Dry shingles often catch fire from burning cinders carried from a chimney as the result of too big a fire.

Putting Out Fires

A fire almost anywhere may be easily put out when it starts, whereas a very few moments' delay may result in so big a fire that nothing can be done to subdue it until it has burned everything inflammable within reach. It is clear, therefore, that everyone should act promptly in case of fire.

Have someone call the fire department at once. At first a fire may be smothered by a few buckets of water or by throwing blankets or woolen clothing upon it. Sand, ashes or dirt will all quickly smother a fire. One of these should always be used instead of water on burning oil, as water will spread the oil and the fire. Anything hanging should, when possible, be pulled down before attempting to smother the fire in it. A bucket brigade will often prove

valuable in putting out a fire. This should consist of two lines of men from the nearest water supply to the fire. The men in one line pass buckets, pitchers or anything else that will hold water from one to another till the last man throws the water on the fire. He returns the buckets to the water supply by the other line. Remember that a draft will fan a fire and therefore keep everything closed as much as possible to prevent drafts.

Rescue of Persons at Fires

While searching through a burning place it will be best to tie a wet handkerchief or cloth over the nose and mouth. Remember that the air within 6 inches of the floor is free from smoke, so when unable to breathe crawl along the floor with the head low, dragging anyone you have rescued behind you. Crawl backward in the same way down a staircase or any slope.

Extinguishing Burning Clothing

If your own clothing catches on fire when you are alone, do not run for help as this will fan the flames and make them burn fiercer.

Lie down on the floor and roll up as tightly as possible in a rug, shawl, overcoat, blanket or other woolen cloth, leaving only the head out. If nothing can be obtained in which to wrap up, lie down and roll over slowly, at the same time beat out the fire with the hands. If another person's clothing catches fire, throw him to the ground and smother the fire with a coat, blanket, rug or the like.

Avoidance of Danger from Hot or Molten Metal

Naturally, only persons working about them are subject to burns from these sources. Common care and watchfulness will do much to prevent them.

Avoidance of Electric Shock

Some general rules on this subject are given under the heading "Electric Shock."

Methods to Prevent Explosions of Gas and Gunpowder

The mixture of illuminating gas and air in certain proportions is a very explosive one. This is also true of the mixture of certain other gases with air. Any unprotected light will cause an explosion, so do not enter a room filled with gas with such a light.

In handling gunpower it will be best to have no matches in the pockets, and lighted cigars, cigarettes, pipes and lights of every description are, of course, extremely dangerous.

Care in Handling Strong Acids and Alkalies.—Ammonia, hydrochloric, carbolic and nitric acids are in more or less general use. All should be handled with the greatest care. Taking corks out of bottles containing any of them may result in a spurt of burning liquid especially if the bottle is warm.

Symptoms of Burns and Scalds.—Severe burning pain. Depending on depth of injury: Reddening of skin; formation of blisters, or destruction of the skin and some of the tissues beneath it. Shock, severe except in slight burns and scalds.

Treatment.—When the skin is simply reddened:

Exclude air by a thin paste made with water and baking soda, starch or flour. Ordinary vaselin or carbolized vaselin, olive or castor oil, and fresh lard or cream are all good. One of the substances mentioned should be smeared over the burned part and on a cloth used to cover it. A light bandage should be put on to hold this dressing in place. The services of a doctor will hardly be required for such injuries.

When blisters have formed:

Treatment may be the same, but if the blistering is very extensive it will be best to show this injury to a doctor.

Destruction of the skin and some of the tissues beneath it:

Deep burns require prompt attention from a physician. Before his arrival they may be treated by the application of the dressing which has been described or like a wound. A specially valuable dressing material for such burns, or in fact for all burns, is picric acid gauze which is wet, in steam if possible, and is then applied in the form of a compress which should be bandaged in place like any other compress. Picric acid may increase burning slightly at first but will lessen it later. Be careful not to get it on the clothes as it will not wash out. In burns from wax or gutta percha do not try to scrape off.

Always remember and treat shock.

A solution of Epsom salts is another good dressing for burns. It is soothing. Ambrine is a remedy for burns which was brought out by the war, during which frightful injuries of this character were produced by liquid flame, boiling oil and boiling tar. Ambrine itself is a patented preparation but it has not been found difficult to make practically identical substances. They all consist essentially of paraffin and resin of such consistence that they remain liquid while hot and solidify on cooling. The method of application is by a spray apparatus or a brush. While it is well to know something of Ambrine, it has not been successfully adapted for use of the first aider.

Burns from Acids and Alkalies

Besides the burns which have been described, burns are frequently caused by strong acids and alkalies. The treatment of burns by acids and alkalies is the same as of burns caused by heat. But first, wash off as quickly as possible; best under a water tap.

Acids: While washing injury, have lime-water procured or make a mixture of baking soda and water or get soapsuds and apply freely. If acid has entered the eye, wash it as quickly as possible with water and then with lime-water. Alcohol is what should be used in burns from carbolic acid. Pour it freely on the burn.

Either tubs of water or shower baths should be provided in chemical or lye plants so that the strong acids may be washed from the wounds immediately. Also sharp, strong scissors or metal snips should be at hand to cut away quickly the acid soaked clothing or even the shoes or boots, for water thrown on the outside of acid-soaked clothing causes more heat to be generated, and increases the severity of the burn.

Alkalies: Wash in same way as with acid burns. Neutralize with vinegar, lemon juice or hard cider. Lime burns of the eye should be washed with a weak solution of vinegar and water or with olive oil. With both acid and alkali burns, after neutralizing, treat like other burns. In severe burns of this character always see a doctor, and when either acid or alkali has entered the eye secure the services of a doctor as soon as possible. Treat shock.

The subject of electric shock is treated at length under the proper heading. The local effect produced by contact with an electric current is a burn. Such burns except those due to a flash are deep. It is easy to understand this as contrary to what is the case in ordinary burns, which affect the surface first and then the deeper structures of the body, an electric burn is due to a current of electricity which passes through the body burning everything in its course to nearly an equal extent.

Such burns are very slow in healing but they are not as painful as other burns as the nerves are destroyed. The direct current causes much severer burns than the alternating. The treatment of electric burns is the same as for other burns.

Flash burns are usually skin burns and are not serious except flash burns of the eye. Persons using electric welding machine should always wear special goggles, of thick dark glass, besides having the protective screen between them and their work.

Warning.—In all burns, whatever the cause, use care in removing the clothing. When the clothing sticks to a burn,

do not pull it off, cut around the part that sticks and soak it off later with oil. Never put cotton on a burn as it will stick worse than clothing does and it will be almost impossible to remove it later.

Sunstroke or Heatstroke and Heat Exhaustion

Sunstroke or Heatstroke

This affects the whole body and is a condition produced by excessive heat. It is a very dangerous one.

Cause.—Sometimes due to direct exposure to the rays of the hot summer sun, especially when the air is moist. Commonly due, however, to somewhat prolonged exposure to excessive heat while working indoors, especially if overfatigued.

Too heavy clothing is likely to help to cause sunstroke, and hats and caps which do not protect the head from the hot summer sun are dangerous.

Drinking any kind of alcoholic liquor before physical exertion with exposure to the summer sun is very apt to result in sunstroke.

Prevention.—Avoidance of exposure to sun in the middle of the day in summer. The best possible ventilation of workrooms in summer, and avoidance of overfatigue as far as possible. Light clothing for summer and light headgear with space above head for ventilation. Avoid alcohol.

If one feels the heat he can often prevent actual sunstroke by stopping work, finding a cool place, lying down, bathing face, hands and chest in cold water and drinking freely of cold water

Symptoms.—Usually before actual attack, pain in the head and feeling of oppression. Insensibility complete, usually. Develops very rapidly. Face red. Pupils dilated. Skin burning hot and dry. No perspiration. Breathing labored and sighing or feeble and gasping. Pulse rapid and full. Often spasms of muscles. Should not be difficult to determine form surroundings, sudden onset and extremely

high temperature of the body, which seems to almost burn your hand.

Treatment.—Consists in reducing temperature. Send for doctor. Remove at once to cool place. Loosen and remove as much clothing as possible.

Apply cold to head and body. To do this, cold water or ice should be rubbed over face, neck, chest and in arm-pits. Is still better to put the sunstruck man in a very cold bath or to wrap him in sheets wrung out in cold water which should be kept wet and cold with water or ice. If this is done, must rub his body continually to prevent shock and bring hot blood to surface.

When consciousness returns he may be allowed to drink cold water freely.

Cold may be discontinued when consciousness returns, but if skin again becomes very hot, must renew. No stimulants.

Heat Exhaustion

Though this condition is caused and prevented in the same ways as sunstroke, it is really quite different from it. Heat exhaustion is just what its name states—exhaustion or collapse due to excessive heat.

Symptoms.—Often begins with dizziness, often nausea and vomiting. Great depression and weakness but not really unconscious so that cannot be aroused. Face pale and covered with clammy sweat but sometimes flushed and hot but never with the great heat that characterizes sunstroke. Breathing shallow. Pulse weak and rapid.

Treatment.—Send for doctor. Remove to cool place and have the man lie down in most comfortable position with clothing loosened. No cold externally, but may sip cold water. Stimulants, as tea, coffee, or aromatic spirits of ammonia.

Frost-bite and Freezing

Frost-bite

This is due to the local effect of cold on the body, parts of which freeze much as do other objects. The parts of the

body which are most liable to frost-bite are the nose, ears, toes and fingers.

Cause.—Cold; insufficient clothing; general weakness with poor circulation of blood.

Prevention.—Protection of the body, especially the exposed parts named above with sufficient covering when it is necessary to expose yourself to intense cold.

Rubbing of any part of the body which becomes very cold in order to increase the circulation, and the supply of warm blood to the cold part.

Symptoms.—In intense cold, frost-bite not infrequently occurs without one's knowing it, but usually the ears, fingers, etc., become painfully cold and then one suddenly realizes that they no longer have any feeling. The color of the frozen part is white or grayish-white.

Treatment.—Object: To gradually bring the frozen part to its natural temperature.

Rub with snow or cold water. Then use warm water gradually.

Warning.—The use of heat at once may result in mortification or death of the frozen part.

Freezing

This condition is produced by long exposure to extreme cold.

Cause.—Extreme cold. Effect of which is increased by over-exertion, hunger, alcoholic liquors and insufficient clothing.

Prevention.—If you expect to be exposed to extreme cold, procure warm clothing sufficient in amount to protect you from its effects. Do not attempt a long journey in the cold without food and do not make the journey so long that you are likely to have to stop and perhaps lie down on account of exhaustion. Do not drink alcoholic liquors, for though they give a temporary sense of warmth, you will be more easily overcome by cold after this effect wears off.

If caught out without shelter in very cold weather use all your energy to keep moving. Lying down under such circumstances almost always results in freezing.

Symptoms.—Surroundings should be taken into account. Depression is so great that appearance of patient is like that of a dead man.

Treatment.—Object is gradually to restore warmth to the body. Take the frozen man into a cold room, rub his limbs toward body with rough cloths wet in cool water; increase temperature of room if possible. This should be done gradually and cloths should be wet in warmer and warmer water. As soon as he can swallow, give stimulant—coffee or tea in small quantities, frequently repeated with the addition of a little aromatic spirits of ammonia.

The man should not be placed before an open fire or in a hot bath until his circulation has become active in cool room. You will know this by an increased force of the pulse, better breathing and more warmth and color in the skin.

QUESTIONS

1. What is a burn?
2. What is a scald?
3. Why are burns of the throat and windpipe specially dangerous?
4. What are the general principles governing the prevention of fires? Suppose a fire occurs, how would you try to put it out?
5. How would you rescue a person in case of fire?
6. How would you put out burning clothing?
7. What are the symptoms of burns and scalds?
8. Treatment: Very slight burns and scalds; where blisters have formed; very deep.
9. What is the treatment of burns from strong acids and alkalies?
10. What can you say of burns from electricity?
11. What is the difference between sunstroke and heat exhaustion? Treatment of each?
12. What is frost-bite? What are the symptoms of frost-bite?
13. How would you treat frost-bite?
14. How would you treat freezing?

PRACTICAL EXERCISES

Treatment of all classes of wounds and burns, with methods of checking bleeding by the class.

LESSON VII

SUFFOCATION AND ARTIFICIAL RESPIRATION; DROWNING; ELECTRIC SHOCK; GAS POISONING; HANGING

What would you do for a person who had been suffocated?

Suffocation is caused in many different ways, but whatever the more remote cause, the immediate cause is always something which interferes with the supply of good air to the lungs, and with the escape of bad air from the lungs. In order to know what to do you must know something about the Respiratory System.

The Respiratory System

This system consists of the Nose and Mouth, the Windpipe and the Lungs. In breathing, the air enters the nose or mouth thence passes to the windpipe and finally reaches the lungs. This is the direction of the good air breathed in. Of course the bad air breathed out has the opposite direction.

At the back of the nose and mouth and at the end of the windpipe is the Larynx, part of which we know as the prominent Adam's Apple in the throat. As the larynx is in front and the gullet is behind, food and water swallowed must pass over the upper end of the larynx and would enter it if some protection were not provided. This is afforded by the Epiglottis, a muscular flap or curtain which falls into position, when we swallow, covering the upper end of the larynx so that ordinarily food does not enter it. Sometimes, however, the epiglottis does not do this, especially if one swallows quickly or attempts to talk while swallowing. In this case choking results from food entering the larynx, or, in common words, one has swallowed the wrong

way. The attempt to give food or water to an unconscious person will also result in choking him because his epiglottis does not close.

The Lungs into which the windpipe opens are two soft, spongy structures, each of which is bag-like in shape and is made up of air cells with many blood-vessels surrounding them; they are sometimes compared to a bunch of grapes. The lungs are hermetically sealed in the chest, so that when the cavity of the chest is increased or diminished in size, the same effect is produced on the lungs themselves. Certain muscles are of great importance in filling and emptying the chest and lungs. Ordinarily, the muscular movement consists simply of the bellows action of the chest and the up and down movement of the diaphragm. In order that the chest may be enlarged to its greatest capacity, however, some of the muscles of the upper extremity must also take part. In order that they may do so, the arms are raised vertically above the head, so that certain muscles attached to the chest wall and to the upper extremities will, when the latter are fixed, raise the ribs and thus enlarge the chest. The chest, too, is elastic and direct pressure upon it will diminish its size and so force the air from the lungs.

The average normal rate of respiration is 16 per minute.

The lungs aerate or oxygenate the blood. The small blood-vessels surrounding the air cells which the pure air breathed in finally reaches, carry dark blood which has lost its oxygen in the body. This blood receives oxygen from the pure air and returns to the heart as bright arterial blood. The air which is expelled from the lungs has not only lost its oxygen to the blood, but has also received certain impurities from it.

From what has been said it is easy to understand that the nose and mouth and the windpipe are simply a passageway for the air going to and coming from the lungs. Naturally, anything which blocks this air in its course will interfere with the supply of air to the lungs and complete blockage will result in early death from suffocation or asphyxiation.

Examples of substances which block the air passages are water in process of drowning or any foreign body in the throat. Illuminating gas and some other gases block out good air from the lungs by themselves replacing it.

A special nerve center in the brain governs breathing just as other similar nerve centers govern other actions of the body. Paralysis of this center will stop the breathing as effectively and completely as blocking the passage of the air to the lungs. In opium poisoning, certain injuries of the brain and in electric shock this center is paralyzed.

Breathing is stopped in still another way. This is by pressure on the chest and adbomen. As when the body is covered by rock, gravel or timbers.

Symptoms of Suffocation.—At first the lips, the face, the tongue and the nails get blue while at the same time the suffocated person gasps and struggles for breath. The eyes are staring and show suffering. Later the struggle for air becomes greater with all the symptoms mentioned intensified. Regular convulsions come on in the fight to get good air. The last stage and, of course, this is often the only one seen, is complete unconsciousness, with stoppage of the breathing or an occasional gasping breath. The lips, face, tongue, nails, and in fact the skin of the whole body is blue.

Artificial Respiration

A suffocated person cannot get the good air into his own lungs and the bad air out but fortunately we can do this for him by certain movements imitating breathing. This is called artificial respiration. Before beginning it loosen all clothing so it does not bind the body anywhere. Keep everybody away; a suffocated person needs all the good air he can get.

Artificial respiration consists of alternate movements which diminish the size of the chest, and then by relieving pressure permit it to regain its original size by its own elasticity.

The Schaefer or Prone Pressure Method of artificial respiration is now generally regarded as far the best. The advantages of the PRONE-PRESSURE METHOD are that it is easy, by it a greater amount of air is got into the lungs, it is not necessary to hold the tongue out and it is much less fatiguing for the operator. Unless the operator is extremely rough no danger attends its practice.

The PRONE PRESSURE METHOD has been adopted by the National Electric Light Assoc. Commission, also the American Gas Assoc., the Associated Telephone Co.'s and the Government Departments. This commission reported that by the spirometer method for accurate determination of the volume of air removed, the old Sylvester method is reported to have an efficiency of 175 cc air volume expressed, against 520 cc of air expressed by the PRONE PRESSURE METHOD, for each pressure, which at 12 times per minute would give a total of 6,240 cc per minute.

The Procedure

At place taken from water, gas, smoke, or electrical contact, lay the victim face downward on flat surface or with head slightly downhill. Turn his head to one side, extend both arms up above head and place one hand under face to protect his open mouth and nose from dirt. Kneel (straddling one or both knees) facing the subject's head.

Place hands over lower ribs, one on each side of backbone and about four inches apart, thumbs and fingers together. If hands are in correct position, the little finger of each hand is over and following the line of lowest rib.

Move weight of body slowly downward and forward for about three seconds—do not slide. Keep arms straight. The shoulders should be behind the hands, so that pressure exerted is forward. Then snap the hands off, allowing ribs to expand quickly, filling lungs with air. Swing body slowly backward to upright position, thus relaxing muscles of back.

At the end of two seconds again place hands in position and apply pressure. This timing (three seconds pressure and two seconds release) uses five seconds for one complete respiration, assuring twelve respirations per minute. This is fast enough and will allow the operator to continue for some time without exhaustion.

To assist in properly timing these movements, repeat either silently or aloud during the period of pressure "*out goes the bad air.*" Then *snap* off the hands and repeat during the period of release, "*in comes the good.*"

Artificial respiration should be kept up for at least an hour and a half. The United States Life Saving Service continues artificial respiration for four hours, if necessary.

It is very important to make sure the motions are not made too fast. The chest may be compared to the bulb of an atomizer. Just as with the atomizer you must let the chest fill completely with air.

Breathing is stimulated by sharply striking the soles of the feet with a stick or a shoe. This so-called "hot footing" is done every 2 or 3 minutes during artificial respiration. It has value. (See Figs. 50, 51, 52 and 53.)

The further treatment is as follows:

Ammonia, on a sponge or handkerchief put under, but not on, the suffocated man's nose will help to revive him.

At the same time that one or two persons are performing artificial respiration, without interfering with them, others should cover him with a dry coat or blankets.

As soon as he begins to breathe himself, but not before, his limbs should be well rubbed toward the heart under the blankets. This will help to restore the circulation.

When he is partially restored he may have a chill and vomit. If he vomits while on his back he must be turned on his side so that the vomited matter will not enter the windpipe.

He should afterward be put to bed well covered and surrounded with hot water bottles. The windows should be opened so that he may have plenty of air.

FIG. 50.—Placing in position.

FIG. 51.—The pressure.
Prone Pressure Method Artificial Respiration.

FIG. 52.—The release.

FIG. 53.—The interval.

Prone Pressure Method Artificial Respiration. *(Continued.)*

After the danger is over he should be allowed to sleep quietly.

He will feel very nervous and shaken for a time and should be given absolute rest till he recovers from this condition. No food except hot beef tea should be given for several hours. Hot coffee, however, is useful as soon as he can swallow and retain it.

A doctor is always required for suffocation but don't wait a moment before giving artificial respiration or he may have a dead man to treat. *Always transport a resuscitated person in a lying down position.*

Warning.—If the breathing stops at any time after it has once begun you must immediately start again with artificial respiration. Let the man breathe as much as he can without help. You are to make the necessary movements when he cannot maintain the regular rate.

The commoner causes of suffocation will now be discussed in more detail. Of course the important treatment for all of them is artificial respiration.

Electric Shock

The more general use of electricity is making accidents due to it more common year by year. The third rail and the live wire are responsible for many injuries and deaths.

The ordinary trolley carries a current of about 500 volts, and incandescent and arc-light currents run from 2,500 to 3,000 volts. The passage of these powerful currents through the body causes dangerous shock or even death.

Prevention.—The third rail is always dangerous, so avoid it. Swinging wires of any kind may somewhere in their course be in contact with live wires, so they should not be touched.

Electric wires must always be carefully avoided.

Symptoms.—Are due to paralysis of the nerve center in the brain which governs breathing and in consequence are those of suffocation.

Sudden loss of consciousness occurs when a powerful electric current passes through the body.

The breathing may be entirely stopped or it may be shallow and only occasional.

Weak pulse as the electric current affects the heart as well as the breathing apparatus.

If the hands are in contact with a live wire, you may not be able to release them at first.

Burns on hands or other parts of the body in contact.

The direct current causes severe burns but is not so dangerous to life. The alternating, while more dangerous to life does not cause as severe burns. Low-voltage currents, especially alternating currents, cause many deaths.

Little difficulty should be experienced in making out cause of injury.

Treatment.—First, rescue; second, treat.

1. **Rescue.**—In some cases it will be possible to shut off current and this should always be done if it can be done quickly. Otherwise your plan is either to separate current from man or man from current. (See Fig. 54.)

A person in contact with wire or rail carrying an electric current will transfer current to rescuer if the latter puts himself in the line of passage of current. Therefore, he must not touch the body of a person touching a live wire or a third rail unless his own body is thoroughly insulated. Naturally, too, he must not himself, in attempting to aid the injured person, bring any part of his body in contact with the live wire or other apparatus carrying the electric current. Moreover, he must act very promptly for the danger is much increased the longer the electric current is permitted to pass through the body. If possible, the rescuer should insulate himself by covering his hands with a rubber coat, rubber sheeting, or even several thicknesses of dry cloth. Silk is a good non-conductor. In addition he should if possible, complete his insulation by standing on a dry board or a thick piece of dry paper, or even a dry coat. Rubber gloves and shoes or boots are

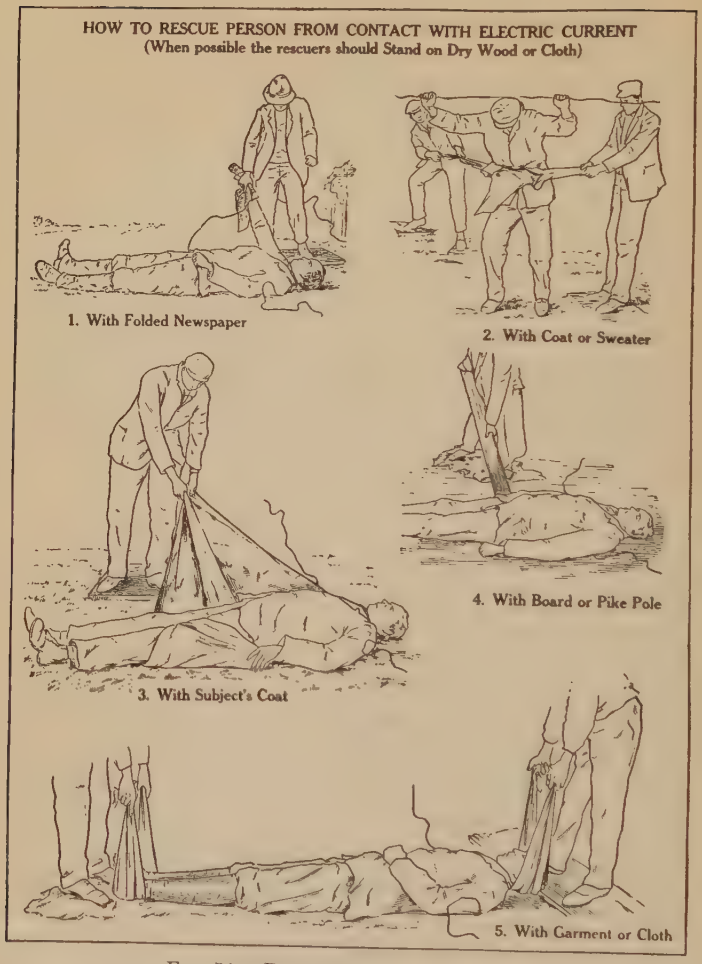

HOW TO RESCUE PERSON FROM CONTACT WITH ELECTRIC CURRENT
(When possible the rescuers should Stand on Dry Wood or Cloth)
1. With Folded Newspaper
2. With Coat or Sweater
3. With Subject's Coat
4. With Board or Pike Pole
5. With Garment or Cloth

FIG. 54.—Rescue methods (electric).

still safer, but usually they cannot be procured quickly. If a live wire is under a person and the ground is dry it will be prefectly safe to stand upon it and to pull him off the wire with the bare hands. But they should touch only his clothing and this must not be wet.

A live wire lying on a person may with safety be flipped off with a dry board or stick.

In removing the live wire from the person or the person from the wire do this with one motion as rocking him to and fro on the wire will increase shock and burn.

A live wire may be safely cut by an axe or hatchet with a dry wooden handle and the electric current may be short-circuited by dropping a crowbar or poker on the wire. These should be dropped on the side from which the current is coming and not on the further side as the latter will not short-circuit the current before it has passed through the body. Drop the metal bar, do not place it on the wire or you will then be made a part of the short circuit and receive the current of electricity through your body.

2. **How to Treat.**—Some cases of electric shock from powerful currents are hopeless from the beginning. It is impossible to tell this at first, however, and, therefore, an attempt should always be made to save life by prompt and long continued treatment. This treatment is artificial respiration.

Burns from electricity should be treated like other burns.

Gas Poisoning

Gas poisoning is not uncommon. Especially is this the case since the automobile has come into such common use.

In gas poisoning there is another factor involved which interferes with respiration. That is to say, the gas not only prevents good air from reaching the lungs like water does in drowning, but the carbon monoxide which all such gases contain actually chemically combines with the blood and thus diminishes the amount of oxygen it will hold.

Oxygen is the life giving principle in the air we breathe, and we are all, of course, dependent on oxygen to keep us alive. Therefore, poisoning with any gas containing carbon monoxide is a specially serious matter.

Causes.—Automobile exhaust gas, illuminating gases, gases from coal heating furnaces, smoke from fires, producer gas, coke oven gas, blast furnace gas and other manufactured gases. The gas victim is suffocated. In time, one tenth of 1 per cent of carbon monoxide will kill a man; 1 per cent will kill him in a few minutes.

Prevention.—Naturally is dependent on the special gas concerned.

Automobiles must not be run in a closed garage.

Leaks in gas pipes should be promptly repaired. Be careful in turning off gas to make sure that gas is actually shut off. It is dangerous to leave a gas jet burning faintly when you go to sleep, as it may go out if pressure in gas main becomes less, and if the pressure is afterwards increased, gas may escape into room in large amount.

Coal gas will escape through red-hot cast iron, and very big fires in such stoves are dangerous, especially in sleeping rooms.

Charcoal burned in open vessels in tight rooms is especially dangerous.

In sewers and wells it is customary to lower a lighted candle or torch; if this does not burn it is certain the air is so impure that one cannot live in it.

In places where gas is manufactured special care is necessary dependent on the particular conditions.

Symptoms.—Are those of suffocation but in those slightly affected are not so severe: Headache, dizziness, sickness at stomach and vomiting; the man is very sleepy, with weak, rapid breathing, and fast pulse.

Treatment.—To rescue an unconscious person in a place filled with gas, move quickly and carry him out without breathing yourself. Take a few deep breaths before enter-

ing and if possible hold breath while in the place. Frequently less gas will be found near floor. So, one may be able to crawl where it would be dangerous to walk.

Notwithstanding the fact that in gas poisoning the carbon monoxide has combined chemically with the blood, it can be got rid of if the proper treatment is given promptly. The quicker it is breathed out the better. The first thing to do is to get the man out of the gas. Special gas masks are provided at certain manufacturing plants. If you have one use it but don't think a handkerchief tied around the mouth and nose is a mask. It is not and dependence on it has killed a good many people.

When you have the man out of the gas he must have all the fresh air he can get, but this does not mean cold air. Cold will kill a gassed man from shock just as it will a wounded man. Therefore, if possible put him in a warm, well ventilated room. Hurry to do this and hurry to start artificial respiration which is the main reliance. Sometimes it will not be needed, but put the man on his belly anyway and be ready to start artificial respiration at any moment if he stops breathing. Keep him quiet and do not walk him around. This causes too much strain on the heart. He should not get up for six hours, though when it is apparent his condition is considerably improved he may be turned on his back. Keep him warm all the time. Certain inhalors have been approved by the commission on resuscitation from gas asphyxiation but as their use goes beyond the first aider it will not be discussed here.

In slight cases the main thing is too keep the man quiet and not to allow him to make any exertion, at the same time always being ready to give artificial respiration if the breathing stops. For one who is conscious stimulants help. The best one easily procurable is strong hot coffee; it may be given liberally.

All men gassed should be kept warm, well covered and surrounded with hot water bags or bottles.

The services of a doctor are needed for the gassed. Moreover, there is danger of pneumonia after gassing and a doctor is required to prevent this.

Drowning

The cause of drowning is, of course, suffocation, the water excluding the air from the lungs.

Symptoms.—Those of suffocation. In addition a frothy fluid is often noticed in the mouth and nose and the body is cold.

Treatment.—Artificial respiration and other measures just as described under Artificial Respiration. If there is mud or water in the mouth, first clean it out by a handkerchief wrapped around the first finger. But don't waste time before beginning artificial respiration. This is very important and may mean the difference between life and death.

Hanging

Hanging is a common means of suicide. As the rope cuts off the air to and from the lungs the result is, of course, suffocation.

Treatment.—Cut down and remove the rope from the neck. Artificial respiration.

QUESTIONS

1. What is the cause of suffocation?
2. Of what does the respiratory system consist?
3. How may the supply of air to the lungs be interfered with?
4. Symptoms of suffocation?
5. What is Artificial Respiration?
6. What should you do for a suffocated person besides performing the movements of artificial respiration?
7. How weak a current will cause dangerous electric shock?
8. Electric shock; prevention; symptoms?
9. What would you do to rescue a person in contact with a live wire?
10. How would you treat him after he had been rescued?

11. How would you treat a burn due to electricity?
12. Gas Poisoning. Prevention? Treatment?
13. What would you do for a person who had attempted suicide by hanging?
14. Drowning. Treatment?

PRACTICAL EXERCISES

Each member of the class should be required to give artificial respiration by the Schaefer Method.

LESSON VIII

UNCONSCIOUSNESS OR INSENSIBILITY POISONING

You are called upon to take care of some one who is insensible what would you do?

Unconsciousness

Unconsciousness is lack of consciousness. One who is unconscious knows nothing of his surroundings, or of what is happening around him. There are, however, different degrees in this condition. That is to say, the same causes when not exerted to so great an extent may only cause partial unconsciousness, which may be recovered from without going further, or may be followed by total unconsciousness. Insensibility and unconsciousness are two different names for the same thing. Perhaps no condition which the first-aider may be called upon to treat may prove more puzzling than this. Unconsciousness may result from a number of different causes, and in order to give the best treatment you should determine first what the cause is. Always make an earnest effort to do this by taking the surroundings into account as well as by examination of the unconscious person.

Suppose, however, that you are unable to determine the cause of unconsciousness. At least make very sure that it is due neither to a poison, to bleeding nor to sunstroke, for each of these demands immediate special treatment, or to suffocation for which you would, of course, give artificial respiration. Then, unless it is necessary to give some special treatment, if the man is pale and weak have him lie down with his head low and warm and stimulate him in

every possible way; on the contrary, if the face is red and pulse is very strong, while the position should also be lying down, the head should be raised. No stimulants should be given in the latter condition and cold water should be sprinkled on face and chest.

It has been well said there are two types of unconsciousness—the white and the red.

A doctor is always needed.

The common causes of unconsciousness are: Bleeding, shock, electric shock, gas poisoning, sunstroke or heatstroke, heat exhaustion, freezing, fainting, fits, apoplexy and injury to the brain, and certain poisons.

The seven causes which head this list have already been discussed at length and are only mentioned here so that the first-aid student may find in one place all the commonest causes of unconsciousness. Likewise and for the same practical reason, poisoning by alcohol, opium and its preparations, and carbolic acid are discussed here.

1. **Bleeding.**—Ordinarily you will see the blood in a wound. Even in internal bleeding from the lungs or stomach, blood is often coughed up or vomited as the case may be.

2. **Shock.**—You learn an injury has been received, or there is other evidence of injury.

3. **Electric Shock and Gas Poisoning.**—Should be no difficulty in finding out the cause.

4. and 5. **Sunstroke and Heat Exhaustion.**—In very hot weather. In sunstroke the patient is so hot that his skin seems to be burning. With heat exhaustion, the skin is usually cold and clammy like in a faint which it resembles closely.

6. **Freezing.**—Should experience no difficulty.

7. **Fainting.**

Cause.—A lack of blood to the brain. Some persons often faint. Fainting is common in any form of weakness, as when recovering from a severe illness. Some people faint at the sight of blood.

Prevention.—A person who has not yet recovered his full strength after an illness or injury should be careful not to overdo physically. Persons who faint from trivial causes require the advice and treatment of a physician. Remember that fainting may be due to a hemorrhage, and if there is any reason to suspect that the unconscious person is bleeding, examine for this carefully and check the bleeding promptly.

Symptoms.—Usually occurs in overheated, crowded places. Individual becomes paler and paler and finally sinks to the floor unconscious. Unconsciousness is partial or complete. Face is pale, frequently covered with cold perspiration. Pupils are natural in size and usually large. Breathing is shallow and sighing. Pulse is weak and rapid. No other cause for unconsciousness can be discovered.

Treatment.—Sometimes can prevent fainting by having person who feels faint double over so that head is between knees. If this does not prove effective at once do not continue. Air, especially cold air, and cold water often prevent actual fainting when a person feels faint. If one has actually fainted, put him in lying-down position with head lower than the rest of his body, so that brain will receive more blood. Loosen clothing, especially around neck, for same purpose. Open windows, if necessary, and keep away crowd so that he may get plenty of air. Sprinkle face and chest with cold water. Smelling salts or ammonia to nose. Rub limbs toward body. Do not allow to get up until fully recovered. May give stimulant when person has so far recovered that he is able to swallow.

8. **Fits.**—These, which usually occur in young adults, begin generally by the afflicted person falling to the ground, perhaps with a cry, and then going through all sorts of convulsive movements, throwing the arms and legs about, jerking the head, rolling the eyes, and foaming at the mouth, and perhaps biting the tongue. There should be little difficulty in telling what is the matter at this stage, but afterward, unconsciousness comes on.

If you can see or find out about the convulsion you will at once know what the trouble is. In the unconscious stage this is not so easy. Disarranged clothing, foam at the mouth, and a bitten tongue should be looked for.

In the unconscious stage, it is only necessary to allow to rest quietly. Do not try to prevent convulsions by holding him. Put him on the ground or floor, or somewhere else where he cannot injure himself by threshing about and put a piece of wood covered with a handkerchief in his mouth so that he cannot bite his tongue.

9. **Apoplexy and Injury to the Brain.**—Apoplexy is due to the bursting of a diseased blood-vessel in the brain. The escaping blood presses on the nerve-centers and this causes the symptoms. An injury of the brain also injures these centers, so from a first-aid standpoint the symptoms and treatment of apoplexy and brain injuries may be considered together.

Symptoms.—Apoplexy often comes on suddenly. In brain injury, may see and learn of injury to head. In brain injury there may be hemorrhages from nose, ears, mouth and eyes. Unconsciousness complete. Face: red in apoplexy, pale in injury. Pupils, large and frequently unequal in size. Eyeballs insensitive to touch. Breathing, snoring. Pulse: Full and unusually slow. Paralysis usually on one side of body. Test by raising arm or leg. If paralyzed, will drop absolutely helpless.

Treatment.—Send for doctor at once. Rest and quiet, in a dark room if possible. In lying-down position with head and shoulders raised on a pillow. Ice or cold cloths to head. Hot bottles to limbs. No stimulants.

10. **Alcoholic Poisoning.**—Alcoholic poisoning or intoxication represents the final stage in acute drunkenness; that is, the common spree.

Symptoms.—Perhaps evidence of intoxication. Unconsciousness, partial or complete; frequently able to arouse man to some extent. Face sometimes flushed and bloated, or may be pale. Skin cool and may be moist. Pupils

natural or large. Eyeballs red, but not insensitive to touch. Breathing about as usual when in deep sleep. Pulse, usually rapid and weak but may be slow. May be strong odor of liquor. No paralysis.

Warning.—Insensibility from alcohol and apoplexy are more often mistaken one for the other than are any other forms of unconsciousness. The most important symptoms in which they differ are the state of the pupils, the sensitiveness of the eyeballs and paralysis. The odor of liquor on the breath is of little value, because a person with apoplexy may have been drinking.

Treatment.—If in any doubt whether drunkenness or apoplexy, always treat for apoplexy and be particularly careful not to make vomit, as this will cause more bleeding into brain.

In drunkenness, if able to arouse sufficiently, give emetic—mustard and water or luke-warm water are usually easily procured. Afterwards strong coffee or aromatic spirits of ammonia. Hot bottles. Rub limbs toward body to increase circulation.

11. **Poisoning by Opium or Some Preparation of Opium, Usually Morphine or Laudanum.**

Cause.—These poisons are often taken in attempts at suicide but a soothing syrup or quieting mixture may contain opium or one of its numerous preparations and as children are susceptible to these drugs cases of poisoning due to them are not uncommon.

Prevention.—Opium mixtures should only be handled by physicians. Soothing syrups should never be given to children. All drugs containing opium are dangerous unless prescribed by a doctor.

Symptoms.—May find person has taken opium or may find bottle which contained poison. Unconsciousness which comes on gradually and finally becomes complete. Face red at first, finally dark purple. Lips bluish. Pupils very small, like pin heads. Breathing full and slow at first, gradually slower and shallow. Pulse, slow and full, after-

wards weak. Possibly smell of laudanum on breath. Symptoms that should be especially noted are pin-head pupils, breathing and that man is first very sleepy and then becomes unconscious.

Treatment.—If able to swallow, give an emetic: mustard and water; salt and water; luke-warm water alone in large quantities. Exact dose unimportant, give in large quantities and repeat if profuse vomiting does not occur. (May have difficulty in getting emetic to work.) Plenty of strong coffee. Try to arouse man by speaking loudly and threatening him, also slap with wet towel. Walk up and down, two persons supporting him. Must stop this if weak or you will exhaust him. Then put on back. Artificial respiration is the most important treatment but before giving it you should if possible cause vomiting as otherwise the poison will continue to be absorbed. You always need a doctor at the earliest possible moment.

12. **Carbolic-acid Poisoning.**

Cause.—This poison is easily obtained and is often used in attempts at suicide. On account of its strong odor it is rarely taken accidentally. Lysol and creolin have the same effects.

Prevention.—Like that of other poisons. As it produces bad burns it should never be applied to the skin.

Symptoms.—You may find poison has been taken or the bottle which contained poison. Vomiting and great pain. Skin covered with cold sweat. If severe case, unconsciousness, usually followed promptly by death. Strong carbolic acid is a very rapid poison. May almost always know by the strong smell of carbolic acid. Lips, tongue and mouth are burned white by pure, and black by impure carbolic acid.

Treatment.—Epsom and Glauber's salts are fair antidotes. Give a couple of tablespoonfuls of either in a little water. The exact quantity is not important except you must be sure to give enough. Though not so good, lime-water may be used to rinse mouth, several glasses of it also being

swallowed. Three or four raw eggs may be given, or castor or sweet oil. Stimulants always, and keep warm.

In burns of the skin from carbolic acid, use alcohol to neutralize the acid. Afterward treat like other burns.

Poisoning

Very probably you will never see anyone who has been poisoned but, on the other hand, if you know what to do you may save a life.

Any substance taken into the body which will cause death is a poison. But only poisons which are swallowed will be considered here.

Prevention.—Accidental poisoning may be prevented to a very great extent by never taking any medicine which is not properly labeled, and by putting poisons, when they must be kept on hand, in a safe place under lock and key.

Symptoms and Evidences of Poisoning.—The symptoms vary somewhat with the special poison. But there are certain evidences which indicate, in the majority of cases, that a poison has been taken.

Sudden and severe sickness in a person who has been in good health, after eating, drinking or taking medicine.

Possibly the sick person has been melancholy or has talked of suicide.

The presence of bottles, glasses or the like in which some of the poison remains.

Frequently a person who has taken poison intentionally becomes frightened and is only too glad to tell some one that he has poisoned himself and what poison he has used.

In accidental poisoning the man is, of course, willing to tell all he knows in reference to the poison.

If a number of persons who have eaten the same food become seriously ill after a meal, it is almost certain they are suffering from poison, probably decayed food or the so-called ptomaine poisoning.

Treatment.—This has been discussed at some length for alcohol, opium and carbolic acid.

The general practice in the treatment of other poisons should be to give an emetic.

Send for a doctor at once and, if possible, have messenger tell him what poison has been taken so that he may bring the proper antidote.

Do not wait for doctor to arrive, but give an emetic to rid body of poison.

Good emetics are: Mustard and water, salt and water, luke-warm water alone in large quantities, ipecac. Do not waste time in getting the exact dose, and repeat if profuse vomiting does not result.

The following brief table, giving the antidotes for special poisons, may be consulted in case of emergency, *always remembering that the first thing to do is to phone for the doctor.* (See Table, Page 146.)

Poisons

Poisons	Symptoms	Antidotes
Corrosive Poisons		
Strong Acids, Sulphuric, Hydrochloric, Nitric, also Strong Alkalis, such as Caustic Soda, Lime, and Potash.	Burn and stain the lips and mouth; burning pain in throat and stomach; straining and vomiting, perhaps suffocation; always shock.	For acids give baking soda, magnesia, lime water or soap-suds. For Alkalis give vinegar, lemon juice. Also in both poisons give large doses of olive oil, milk, eggs, or flour and water, to dilute and soothe the parts, and then an emetic.
Irritant Poisons		
Bichloride Tablets, Paris Green, Sugar of Lead, Arsenic Phosphorous, Poisonous Plants, Cyanide of Potash.	These do not stain. Metallic taste in mouth; burning in throat and stomach; vomiting and purging.	Dilute and soothe with large quantities of salad oil, milk, eggs, soapsuds, starch or flour water. Then give an emetic like salt water or mustard and water. Then stimulants like strong coffee or tea, or spirits of ammonia. (No oil in Phosphorous Poisoning.)
Nerve Poisons		
Opium, Morphine, Paragoric, etc.	Produce deep sleep; pupils of eyes small; insensibility; face flushed.	Give emetic if poison is just taken. Keep awake by strong coffee; slapping with wet towels; walking the victim supported on each side, and Artificial Respiration.
Strychnine (the most common), Belladonna, Prussic Acid, etc.	Convulsions, twitching, delirium and suffocation.	Give an emetic at once, or tickle the back of throat with the finger till vomiting is produced; artificial respiration if breathing stops; stimulants; get the doctor at once.

Iodine Poisoning.

Owing to the now universal use of tincture of iodine in the treatment of scratches, cuts and wounds, it is found in every household, and as a consequence, we know and hear of a great many cases where children and adults have taken tincture of iodine accidentally, or otherwise. But fortunately iodine is not a virulent poison, and it is quite rare that we hear of a serious or fatal case of iodine poisoning. The antidote for iodine poisoning is to give immediately two tablespoonsful of starch in a teacup of water, either corn starch or laundry starch, and then produce vomiting by putting the finger in the throat, or an emetic.

QUESTIONS

1. What is unconsciousness?
2. To what causes is it most commonly due?
3. Explain how you would make out the cause?
4. If you were unable to do this what would you do?
5. Fainting; cause; prevention; symptoms and treatment?
6. Symptoms and treatment of fits?
7. Alcoholic poisoning, with what is it often confused and what should you do to prevent such a mistake?
8. Treatment of alcoholic poisoning.
9. Apoplexy and injury to the brain, symptoms and treatment?
10. Symptoms and treatment of opium poisoning.
11. Symptoms and treatment of carbolic-acid poisoning.
12. What would make you think a person had been poisoned?
13. What would you do if you thought a poison had been taken but could not find out what the poison was?

PRACTICAL EXERCISES

Members of the class should show what they would do in red and white unconsciousness. Demonstrate how an emetic is prepared.

LESSON IX

COMMON EMERGENCIES AND INJURIES IN THE HOME AND OF INDOOR AND OUTDOOR SPORTS

1. Home. 2. Gymnasium. 3. Baseball. 4. Football. 5. Boating, Skating, Swimming and Life Saving. 6. Shooting and Fishing. 7. Automobile. 8. Camping and Summer Outings.

1. Home

Emergencies occur in illness as well as in injury and one should be prepared to meet them. This does not mean however that the Red Cross advocates amateur doctoring. The contrary is the case. If one wants his watch repaired he sends it to a skilled watch maker; to one who knows the purpose and position of each of its delicate and intricate parts. Our bodies are no less delicate and intricate than a watch and should receive, to say the least, as good care. This can only be supplied by a doctor.

Knowledge of first aid should teach you this. If it does not you have failed to profit by your course of instruction and will harm instead of help. It has already been strongly emphasized that the first aider should never invade the doctor's field. But it is deemed wise to state this again at this point as it is proposed now to dicuss a very few emergencies having to do with illness and not injury. It has proved that people without a medical training sometimes assume charge who would never think of doing so in injuries. They, if they but knew it, are on no less dangerous ground.

The best advice which can be given is to confine yourself to real emergencies in illness as well as in injury and to call a doctor promptly. This will save health, money and time.

Prevention of home injuries is a most important matter for, accidents in the household and about the home premises are more common than under almost any other circumstances.

The statement is made by the Travelers Insurance Company, to which indebtedness is acknowledged for some of the material in this lesson, that nearly twenty-eight per cent of the total number of claims paid for accidental injuries (not including industrial accidents) by that company during a recent year, were for injuries received in and about the household, the number being considerably larger than for any other class of accidents.

In a certain coroner's office, the records for eleven years show that more than 50 per cent of all fatal accidents were the results of injuries received in the home. Testimony to the same effect might be multiplied, but this is not necessary, for without doing so, it can be set down as a fact —that the home will not prove the place of security which it should, unless common care is exercised to prevent accidents.

Many home accidents are due to falls; and ladders are frequently responsible for them. Broken or rickety ladders are always unsafe, and all ladders should be firmly set and one using them should be careful to step on the rungs squarely, so as not to overbalance. If you use a chair, table, or barrel in place of a ladder, even more care is necessary.

Many serious accidents are due to falls on stairs. Hand railings are necessary, and good light with no loose carpets or objects carelessly left in the way. It is really quite a feat to balance ones' self in going up and down stairs, but we are so accustomed to it that we forget this is the case. It may be brought sharply to our attention by a bad fall, if we run down stairs too rapidly.

Slippery surfaces are also responsible for many bad falls. A rubber mat prevents slipping in a bath-tub. Highly waxed floors are dangerous and so is newly washed oil-cloth or linoleum. The danger of slippery floors, or any floor for

the matter of that, is much increased if objects are left to lie on them which can be tripped over. A cake of soap, innocent as it is in its proper place, constitutes a man trap when lying on the floor. Pencils and other round objects on the floor are almost as dangerous. Pails, brooms, loose carpets and rugs trip the unwary, and often the wary, especially in a dark place.

Outside steps and platforms should, in winter, either be promptly cleared of ice, or be sprinkled with sawdust or ashes.

All openings in the yard or anywhere else about the house should have close well-fitting covers on a level with the ground or floor.

We are so accustomed to the performance of our daily household tasks that we never think there is any danger connected with them till we receive an injury. The majority of these accidents occur from the use of sharp tools. A razor, a carving knife or an ice pick can produce as bad a cut as a factory tool, if it is not used carefully. Tools are commonly used in the household, and we often fail to safeguard them as is done habitually in the factory and workshop. In the first place, all home tools should be kept in a tool box so that one may not injure himself through encountering them through mischance. Children are in particular danger from sharp tools carelessly left anywhere about the house, but adults also frequently suffer injury from this practice.

A good many nasty cuts result from using pocket knives to pierce holes. An awl and not a knife is the proper instrument for this purpose. In using a pocket knife, don't draw it toward you, push it away from you.

Openers can be obtained for glass jars, tin cans and bottles. Use them and not something else.

A. Colds

In our climate, colds of one kind or another are far more common than any other disease. Nor is a cold always as

trivial as it is sometimes thought to be. On the contrary neglected colds are sometimes the beginning of very serious diseases. Tuberculosis and pneumonia begin as colds.

Prevention.—With a severe cold and if one takes cold easily a physician should be consulted as it is very likely there is something wrong you do not know about and very possibly this may be corrected if taken in time but if allowed to run on may become incurable. You can yourself do a good deal to prevent catching the ordinary cold, however. Colds are due to germs, to too dry air or to getting chilled or sometimes to all combined. The exact cause is not so important, however, so far as prevention is concerned. Cold baths increase your resistance. You should dress according to the season and avoid getting wet, if you do get wet change your wet clothing as soon as possible. Never sit in a draft. Keep out of dusty places and see the rooms you live in do not get too dry. Moreover, it is much better to keep out of crowded places in winter when colds are very prevalent for in them you are specially liable to catch cold from someone else.

Treatment.—Many of the patent medicines advertised to cure colds contain dangerous drugs. You will not use them if you respect either your health or your pocket book. All they can do for you you can do for yourself much better, more safely, and cheaper.

Subject to the warning already given about calling in a doctor a cold may be cared for as follows: To prevent a beginning cold free use of cathartics is of value. Take a big dose of salts in the morning. This will reduce blood pressure and so the congestion caused by the cold. Also, to break up a cold, at night drink freely of hot lemonade after taking a hot bath. Then wrap up warmly to increase sweating. This also reduces blood pressure and congestion. You must be careful after doing this not to expose yourself the next day for this is likely to reproduce the congestion of the respiratory tract and perhaps result in a more severe cold than before.

If your throat feels sore, gargle it several times during the day with a solution made by putting one quarter of a teaspoonful of salt in half a glass of warm water.

Light eating for 24 to 36 hours also helps a cold a good deal.

To clear your nostrils and throat, you should use an atomizer. You can make your solutions yourself. A good one is a half a teaspoonful of salt and a half a teaspoonful of baking soda in a glass of warm water. This may be used as a gargle and snuffed up the nose if you have no atomizer. After using the atomizer spray it is a good thing to use a spray of liquid vaselin as this protects the membranes of the throat and nose. This is especially necessary if one must go out of doors into the cold air. With a cold, however, it is an excellent plan to stay in the house for a day or two. Generally this pays in the end by a more prompt recovery.

B. Cramp or Colic

As every one knows abdominal cramp is a severe pain in the abdomen which comes, lets up, and comes again, The cramps may follow one another very rapidly or there may be some time between them.

Cause.—Common cramp is due to a spasm of the intestines caused by indigestible food, or by cold, especially when overheated in hot weather. More uncommon causes are appendicitis and gall or kidney stones.

Prevention.—As one of the commonest causes of cramp is indigestible food you should be careful to avoid this; unripe fruit and partially spoiled food are most dangerous. Even in very hot weather the abdomen should be lightly covered, especially at night, and if one is subject to cramps they will often be prevented by the use of an abdominal band.

Prevention of cramp due to the other causes which have been mentioned is too complicated a subject for discussion except in medical books.

Symptoms.—Severe cramping pain in the abdomen and shock in severe cases. If shock is severe, it is well to conclude that something more serious than intestinal cramp is present.

Treatment.—For external use: (*a*) rubbing the abdomen gently (*b*) application of a hot water bottle. For internal use: (*c*) a soda mint tablet may be given. The immediate use of cathartics or forced attempts to vomit are not advised because if the condition is due to appendicitis such treatment may lead to rupture of the bowel.

C. Nausea and Vomiting

These are also usually due to indigestible food but may be caused by dyspepsia or nervousness.

Treatment.—When due to indigestible food, several large drinks of luke-warm water will usually cause free vomiting and will wash out the stomach, which is very desirable. The further treatment is the same whatever the cause. Person should lie down in cool place. Hot applications to abdomen; cloths wrung out in hot water or a mustard plaster. A soda mint tablet or a little baking soda will usually stop both nausea and vomiting and in other cases sucking small lumps of ice will be found efficacious.

D. Hiccough

Is usually due to overeating and indigestion. It is caused by a spasmodic contraction of the diaphragm, the great muscle which separates the chest from the abdomen. This is the reason that holding the breath as long as possible will usually cure it as the air in the chest forces the diaphragm down so it cannot contract. Drinking a large glass of water in small sips without taking a breath has exactly the same effect. The reason that a scare stops hiccough sometimes is because this causes the patient to take a long breath. If none of these methods is successful, vomiting by removing the irritating material from the stomach will almost always cure the hiccough.

E. Chill from Exposure

When one is exposed to the cold, especially to cold rain or snow, or falls into cold water he will often become what is commonly called "chilled through."

Cause.—This condition is due to the fact that the cold contracts the blood-vessels of the skin, driving the blood to the interior of the body. This gives one the sensation of chilliness.

Symptoms.—You are chilly. The lips become blue and the teeth chatter.

Treatment.—Remove the clothing, if possible, and put into a warm bed, covering warmly. Two or three hot bottles will warm the bed well. Rubbing his limbs and body will also bring the blood to the surface and so help to cure the chill. Hot drinks should also be given. Hot tea, hot coffee, hot milk, and hot lemonade, are all good.

F. Convulsions in Children

Cause.—Something which irritates the brain. There are many conditions in children which have this effect especially in nervous children. Indigestion takes first place as a cause.

Symptoms.—Sometimes the convulsions are preceded by other symptoms such as restlessness, irritability and twitching of the muscles in various parts of the body. More commonly, however, the attack comes on suddenly with little warning. Usually the first thing noticed is paleness of the face, the eyes are fixed and sometimes rolled up. And in a moment or two twitchings begin in the muscles of the eye or face or in the limbs and then all parts of the body participate in the convulsions. In all true convulsions there is loss of consciousness. These convulsions keep up in the most distressing manner from a few moments to half an hour, then gradually get less frequent and finally cease leaving the child in a condition of stupor. Death may occur though this is rare except in very young infants. It is usually due to suffocation or to exhaustion. There is no difficulty in telling when a child is having a convulsion.

Treatment.—A doctor should be called. Till he comes keep the child as quiet as possible. Remember his nervous system is so disturbed the slightest irritation may bring on convulsions even when they are stopping. Cold should be applied to the head by means of an ice cap or cold cloths. Counter irritation is practiced on the body so as to bring the blood to the skin. The mustard bath has been used for this from time immemorial. It is better to use the mustard pack however as this disturbs the child less. The mustard foot bath may be used at the same time while the child is lying in its crib. They should be continued till the skin is well reddened. The mustard pack is applied to the stripped child lying on a blanket. His body is surrounded by a large towel wrung out in mustard water, made by dissolving one tablespoonful of mustard in a quart of tepid water. The towel is put around the child while dripping and he is then rolled in the blanket. It may be continued for ten to fifteen minutes. To make the mustard bath put four or five tablespoonfuls of powdered mustard in a gallon of tepid water. To this should be added four or five gallons of plain water. Hot water may be added to make the temperature of the bath 100° to 103°F.

G. Tooth-ache

Tooth-ache is due to decay and to food entering the cavity of a tooth where it decomposes and causes irritation and thus pain from the effect of this irritation on the sensitive nerves.

Prevention of decay of the teeth consists first and foremost in visiting a dentist at half yearly intervals so he may put your teeth in condition to withstand decay.

You should habitually remove all food from between them; for such food ferments quickly thus producing an acid which corrodes the teeth. The teeth should be brushed night and morning and after each meal if possible. Dental floss should also be used if difficulty is experienced in dislodging particles from between the teeth with a brush.

For the same purpose a mouth wash will be found very useful especially at night.

Treatment.—The best way for you to treat an aching tooth is for you to go to a dentist immediately. Toothache often starts at night, however, or under such circumstances that you cannot get to a dentist at once. Therefore you may be compelled to take care of an aching tooth yourself for the time being. If you have a cavity and the cavity can be reached, it should be cleaned out and afterwards something put in it to deaden the nerve. To clean it, twist a very small piece of cotton around a toothpick or fine knitting-needle and put it in the hole in the tooth, twisting it around and around so as to clean out the cavity thoroughly. After this has been done another small piece of cotton should be dipped in oil of cloves and then gently put into the cavity on the end of the tooth-pick or needle. If the cavity cannot be reached and this is often the case, the aching tooth must be treated by an application to its gum between the latter and the cheek. A small piece of absorbent cotton soaked in spirits of camphor is excellent for this purpose. The burning caused by it is severe, but it will usually stop the tooth-ache. Tooth-plasters may be used in the same way. Of course, these are merely emergency measures and because they stop the tooth-ache for the time being, this does not mean that it is safe for you to go on without the services of a dentist. You should realize that unless you have proper attention, decay will go on in the tooth, you will have tooth-ache again, and will finally lose the tooth.

H. Ear-ache

This is particularly common in children, and may be due to bad teeth, to disease of the throat, or to trouble in the ear itself.

Treatment.—Ear-ache is likely to prove a serious matter and if not relieved in a few hours may be very dangerous. For this reason no ear-ache should be neglected but a doctor should be consulted. Sometimes ear-ache is due to bad teeth. The teeth should always be examined, and if a cavity is found it should be treated in the way already described. If nothing is found the matter with the teeth or

treatment of bad teeth fails to relieve the pain in the ear, it will be necessary to try to stop the pain by treating the ear itself. Cloths wrung out in hot water changed as soon as they begin to grow cold, or a hot-water bottle put on the face covering the outside of the ear will often cure ear-ache. Another method is to heat a cloth very hot and to pour a few drops of alcohol on its center and then apply this over the ear so that the alcohol fumes will enter the ear. Sweet oil just hot enough not to burn and then putting a few drops in the ear and introducing a small plug of absorbent cotton should be tried if the other remedies mentioned do not prove effective.

Severe ear-ache always demands the services of a doctor as disease of the inner ear may result in perforation of the ear-drum, and perhaps permanent deafness or even worse, mastoid disease which may often be prevented by a physician if treated promptly.

I. Styes

Styes are due to inflammation at the edge of the eye-lid, usually of the small glands there. As they commonly indicate ill health or an error of vision, a doctor should be consulted in order that he may give treatment which will prevent styes appearing again. The pain from a stye may be diminished to a considerable extent by wetting a cloth with water as hot as can be borne and putting it on the eye. If matter appears, a doctor should make the small cut necessary to permit it to escape.

J. Prickly Heat

Is the well-known irritating disease of the skin produced by heat. It is most common in children whose skins are very delicate and occurs in hot weather, not infrequently being due to too much clothing. It may be prevented to a considerable extent, even in the tropics, by light clothing, by not exercising so as to cause sweating and by avoiding heating drinks. A good talcum powder frequently applied also does much to prevent this annoying disease of the skin.

When prickly heat is severe the skin should be bathed with a mixture of one part alcohol to three of water, afterward dusting with talcum powder. Lime water with about two drops of carbolic acid to the ounce is an excellent application for prickly heat, as the carbolic acid numbs the nerves of the painful, irritated skin. One of these applications should always be put on after bathing.

Hives or Nettle Rash

This skin affection is a very irritating painful eruption appearing suddenly on some part or parts of the body in the form of wheals, white or pinkish elevations. These wheals last for a few minutes to several hours, disappear and are succeeded by others. The eruption is accompanied by heat, intense burning and itching of the skin. It is not a serious affection and usually recovered from in twenty-four hours.

Causes.—The majority of cases of Hives are caused by some disorder of digestion. Some persons are especially susceptible to attacks after eating such articles of food as oysters, lobster, crabs, clams, or other shell fish; also, salted fish cause Hives in some individuals; strawberries, grape skins and mushrooms in others. It is also caused by taking certain drugs and medicines.

Prevention.—Persons should avoid eating certain articles of food that have caused previous attacks; also, should refrain from taking food when over-heated, or eating foods that are hard to digest.

Treatment.—In severe acute cases coming on soon after eating an emetic of salt water or mustard and water can be given to produce vomiting, then after vomiting is produced a purgative like Rochelle or Epsom Salts, should be administered. But in all acute cases it is highly advisable to call a Doctor at once and obey his directions.

For the itching a warm bath containing a handful of washing soda can be taken; also, a strong solution Bicarbonate of soda and water sopped on the parts gives relief; rubbing the parts with spirits of camphor also relieves the itching. A person subject to Hives should wear undergarments of a soft texture, cotton or silk.

K. Chilblains

This common condition is caused by chilling of some part of the body and is most frequently seen in old people with poor circulation. The most common places for chilblains are the heel, toes, ears, nose and fingers.

In sensitive people, as it is due to cold, it may be prevented by warm clothing and frequent bathing of the part of the body affected in warm water, afterward drying it with soft towels.

Symptoms.—They are the well-known red appearance of the skin, which appears when the part is brought near the heat, especially in winter after being in the cold. There is considerable burning and itching.

Treatment.—Paint every two or three days with tincture of iodine pure or diluted with alcohol. Several coats of collodion at intervals of a few days are also good, as the collodion exerts considerable pressure on the dilated blood-vessels. If these measures fail, it is best to consult a physician, as chilblains are sometimes very difficult to cure.

L. Corns

Corns are of two kinds—hard and soft. The former occur at the sides of the toes and at the sides and bottoms of the feet. Soft corns form between the toes where the natural secretion makes the skin soft and pulpy. Both varieties of corns may be prevented by the most scrupulous cleanliness of the feet and stockings and by wearing well-fitting shoes which do not rub and so cause irritation of the skin which leads to the formation of a corn.

If a callus begins to form, rub the place gently with vaselin night and morning. Nitrate of silver stick will usually cause corns to disappear. An excellent corn remedy is one part of salicylic acid to three parts of simple cerate. Bathe and soak the foot in hot water for twenty minutes, dry and apply an ointment; cover corn with cotton.

Hard corns should never be cut but should be rubbed down smooth with sandpaper after washing the skin. They should then be covered with a corn plaster or a piece of

adhesive plaster. Cutting a corn, if you get below the hard skin of the corn, is likely to prove dangerous, as it often results in blood-poisoning.

Soft corns should be treated by careful washing and drying of the foot, especially between the toes, then dusting in a little talcum powder and keeping the toes separated by a small piece of gauze. A corn which has become inflamed requires treatment from a doctor on account of the danger of blood-poisoning.

1. Sports

As it is now universally admitted that great physical benefit as well as pleasure result from engaging in healthy sports, the possibility of injuries occurring therein should not be given too heavy weight. The man or boy who enters a physical contest will not go far if he has always before his eyes the possibility of accident. In sport, just as in everything else in life, the successful contestant is he who puts all his energy into making the best possible showing and nothing that is said here should be taken to mean that he should not do this. The risks run are but part of the game and should be accepted as such. Remember that foolhardiness is not courage, however.

There is also one other point which is worthy of consideration here. Violent physical exertion should be gradually prepared for and not rushed into without preparation. A man who is soft has not only soft voluntary muscles, but the muscle of his heart is also soft so that it may be easily strained with perhaps permanent injury. Many of the accidents which we read of as occurring to those engaged in sports are due to their poor physical condition. A man or boy in good training has firm muscles which, to a great extent, protect his internal organs from blows and falls. Soft muscles cannot do this and with them a trivial blow may prove dangerous.

2. Gymnasium

Bruises, strains, sprains, dislocations and fractures are the commonest results of gymnasium accidents. The section

devoted to these subjects should therefore be studied in connection with them. Boxing is of course responsible for many bruises, especially black eye, which should be treated by the application of cold water or a cold knife-blade. The so-called "alum curd" made by putting powdered alum in milk till a curd is formed is also an excellent application. Both cold and alum contract the vessels and so prevent the escape of more blood. Persons said to be knocked out by blows or falls in gymnasiums will in almost all cases be found to be suffering from shock and should be so treated.

3. Baseball

Severe injuries of the head are sometimes caused by being struck by balls or bats. Blows in the abdomen are also not uncommon. Both should be treated like any other severe injury of the same general character. The services of a doctor should be secured as soon as possible.

Bruises are common but their treatment is not peculiar.

Injuries of the hands and fingers are the commonest baseball injuries. Dislocated and fractured fingers are treated just as are these injuries from other causes.

The name "split finger" is given to the splitting down of the web between the fingers and also to the splitting of the soft tissues of the fingers themselves. Split of the web between the fingers makes generally a clear-cut wound which often bleeds freely. The best way to treat it is to bring the two fingers together and to bandage them in this position without putting anything in contact with the wound itself. Preferably, before this is done, if you have it, the wound should be painted with iodine. This injury should be shown to a doctor.

Splits of the fingers themselves are best dressed with iodine, a piece of gauze and a bandage. A surgically clean bandage may be put directly on such a wound. Severe splits of this character should also be shown to a doctor. Shock is sometimes severe in these injuries and should be treated.

The finger-nails are frequently torn partially off by baseballs. They should be replaced and held in place by a strip of adhesive plaster.

Wounds of the legs and feet, and sometimes of the hands, from the spiked shoes worn by baseball players, are common.

Shocks must often be treated.

These injuries demand attention from a physician.

Emergency supplies are now usually kept on hand by professional and college teams. All that are needed are a few narrow gauze bandages wrapped up so they are kept clean, two first-aid packets; a roll of adhesive plaster, iodine, a two-ounce bottle of aromatic spirits of ammonia, a sharp knife, a pair of scissors and a few safety and common pins.

4. Football

This, on account of the very severe exertion involved, is the best example of a game which should not be played without careful and gradual preparation.

Bruises, strains, sprains, dislocations and fractures are not particularly uncommon. They are treated exactly like such injuries generally. The knocking out of a football player is usually due either to shock or exhaustion. Men in fine condition recover from slight shock promptly and are again able to take part in the game. Exhaustion always requires rest, and when a man is visibly exhausted it will certainly be better for him, and probably for the eleven, to which he belongs, to take him out of the game.

Of course, at big games doctors are, as they should be, available to treat football injuries.

5. Boating, Skating and Swimming

Drowning is the only accident which will be discussed here.

Prevention.—This will be spoken of under two heads:
1. Prevention of accidents that may result in drowning.
2. Rescue of Drowning Persons.

1. Prevention of Accidents That May Result in Drowning.—Boating accidents are frequent in all parts of the country during the summer season. In order to do your part to prevent them—

Remember: A light boat is not intended for heavy seas; do not change seats except in a wide and steady boat, and above all things do not put yourself in the class of idiots who rock the boat. In case you are thrown into deep water by the turning over of a boat, or from any other cause, do not lose your presence of mind even if you cannot swim. Remember that the water will almost support your weight. Allow yourself to sink low so your nose is just above the water and support yourself by a hand on the boat. Even an oar under the chin will hold you up. If there is nothing which will help to support you, lie flat on the back with the arm stretched out. Especially in salt water with light clothing, one may float almost indefinitely in this position. To do so it is necessary to keep cool if the water or spray rises over the face momentarily. Throwing up the head, or still worse the limbs, to prevent this will result in your sinking.

At the seashore, unless you are a strong swimmer, do not go outside the life-lines and if the undertow is strong be careful that you do not walk out so far that you may be carried off your feet.

The art of swimming should be made a part of the education of every boy and girl. It is not enough to know how to swim a few strokes. One should at least be able to swim for a few moments while dressed.

Very cold water and very long swims are likely to result in the exhaustion of even a strong swimmer and are therefore hazardous unless a boat accompanies the swimmer.

2. Rescue of Drowning Persons.—If possible, do not attempt to rescue a drowning person in deep water by entering the water yourself. The best interests of the drowning persons are served, when this is practicable by holding out or throwing something into the water on which he can support himself till he can be pulled ashore or reached in a boat.

In case a person has fallen into deep water near the shore take an oar, a pole or even your coat and hold it out so the drowning person may grasp it. Life preservers, boxes, boards or logs may also be thrown into the water close to the person drowning. As has been stated above, a small, floating object is quite sufficient to sustain a person's weight in the water.

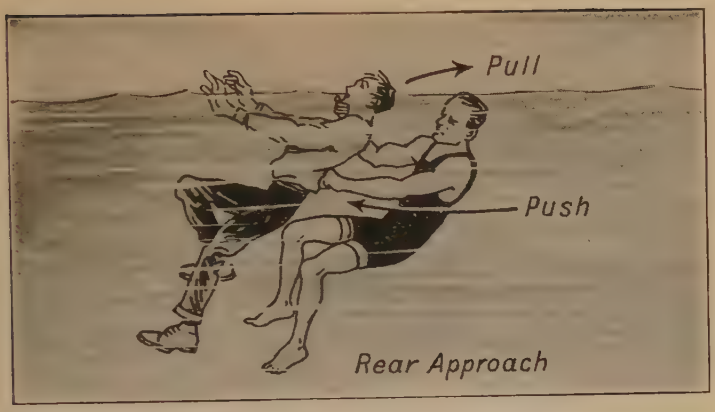
If the person in danger of drowning is so far from the shore that the methods just spoken of cannot be used you must enter the water to rescue him. Take off as much of your clothing as possible. It is especially necessary to rid yourself of your shoes. If you are not a strong swimmer it will be much better to support yourself with a life preserver, a board, box, or the like when swimming out to the drowning person. Always take care not to permit him to grasp you, for this may result in drowning you both.

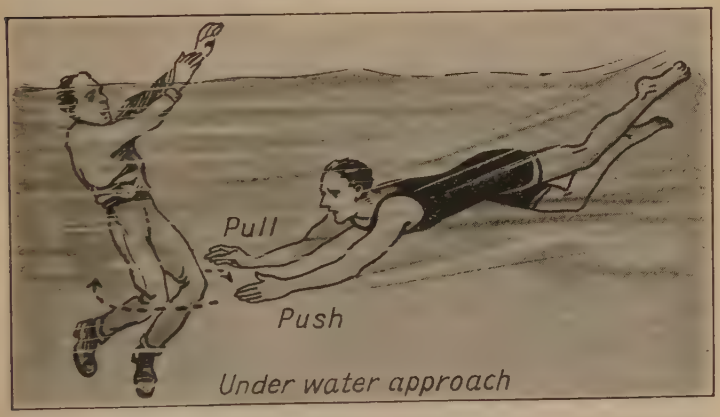
What follows is quoted from the Red Cross Circular on Life Saving methods.

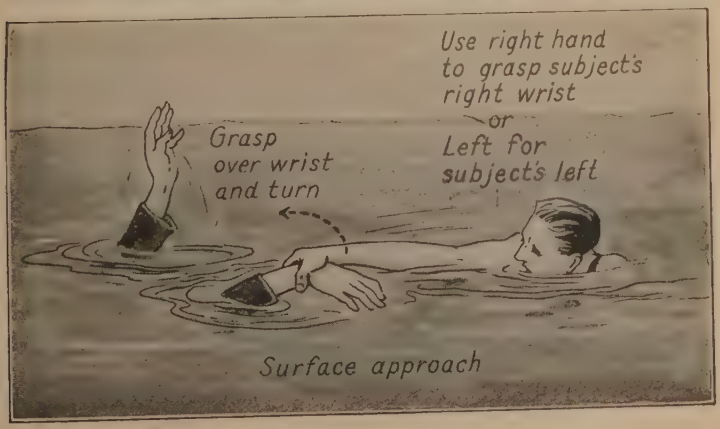
Approaches.—It is safest to approach a drowning person from the rear, swimming to a point directly behind him, reaching one hand under his chin, and pulling his head back. At the same time, place the other hand under his back to raise him into a horizontal position. Still holding chin in one hand, start swimming with free hand and scissors kick until body is moving along smoothly; then change to position for carry.

When it is impossible to approach from the rear, either the under-water or the surface approach can be used. The under-water approach is undesirable where the water is very muddy and it might be difficult to locate the subject under the water.

To make the under-water approach, swim to a point about six feet in front of subject, dive under and grasp his knees, turning him about. During the dive, and in reaching for subject's knees, keep your arms straight before you to avoid getting close enough to him to have him grasp you with his legs. After turning subject about, come up behind him and proceed as in rear approach.


Pull
Push
Rear Approach


Pull
Push
Under water approach


Use right hand
to grasp subject's
right wrist
or
Left for
subject's left
Grasp
over wrist
and turn
Surface approach

To make surface approach, swim toward subject, facing him, reach in with your right hand and grasp his right wrist (or left hand to left wrist). While treading water, lean backward, pulling subject toward yourself, quickly spinning him around until his back is turned to you, and then proceed as in rear approach.

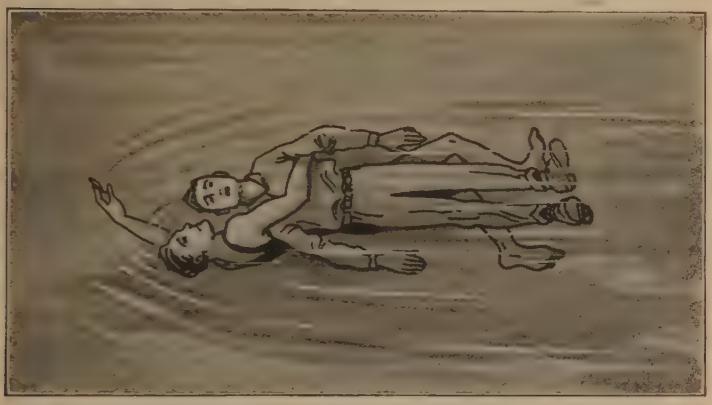
Carries.—Each of the first three methods of carrying is preceded by a swim of 60 feet, terminating in surface or under-water approach (or else may be alternated) and getting the subject moving with your hand under his chin. Then position is changed to a proper carry. Subject's face must be kept out of water while he is being carried.

Head Carry.—Cover subject's ears with palms of your hands, so that your middle finger rests along his jaw-bone

on each side. Holding his chin high, to arch subject's back, swim, using frog kick or vertical or reverse scissors kick. In the latter, the hips are tipped slightly to one side, and legs separated as in side stroke, but with upper leg opening backward and under leg forward, reversing the ordinary scissors kick to avoid fouling the subject.

Cross Chest Carry.—From position back of subject, reach across his shoulder and chest, placing your hand under his farther arm-pit. (Shoulder blade is more comfortable

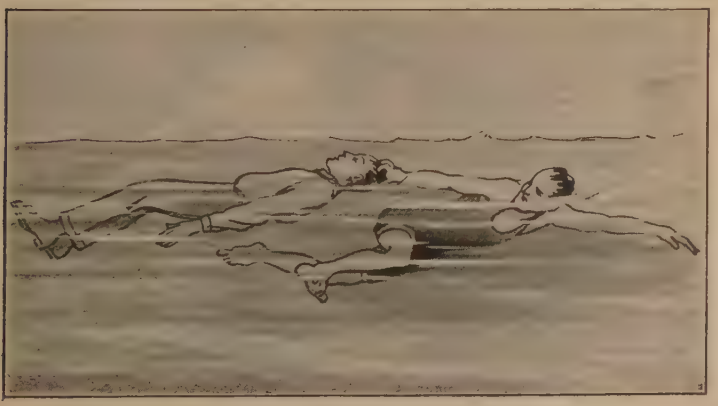
if you can reach it.) Hold subject so that your hip is directly under center of his back, and his shoulder tight under your arm-pit. Swim on your side, using scissors



kick and side-arm pull. Carry for 60 feet, keeping his head out of water and holding him firmly in place with elbow against his shoulder.

This carry is a favorite among life-savers because subject is completely under control.

Hair Carry.—From position back of subject, place your hand at crown of his head, your fingers toward his forehead,



grasping a handful of hair. With your hand in this position he will not roll over. Swim on your side with side arm pull and scissors kick. Keep your holding arm straight.

This carry is especially easy to learn and is optional with the Arm-lock Carry.

Arm-lock Carry.—From position back of subject, reach under subject's near arm, and grasp his farther arm at the wrist.

Your arm being under subject's back, he is raised high in the water as you swim with scissors kick and side arm pull.

Keep subject close to you, his near arm pressed tight against you.

Tired Swimmer's Carry.[1]—In approaching, simply swim to the subject, telling him to lie on his back and place his hands on your shoulders, with his arms straight and feet spread apart.

Swim breast stroke, using either frog or scissors kick. Watch subject's face.

[1] This carry is intended only for assisting a person who has become tired. It should never be used on a struggling person.

Release Methods

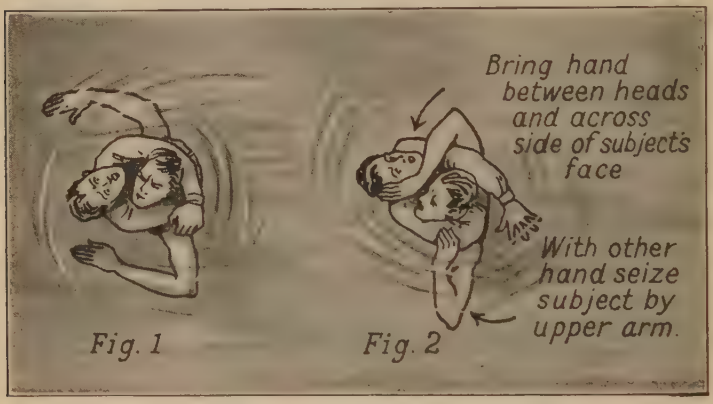
If a drowning person is struggling violently, so that it is impossible to subdue him or grasp him with safety, it is well to simply wait for him to exhaust himself before attempting to carry him to safety. Never attempt to strike the subject to render him unconscious. Such a feat is almost impossible in the water. Breaking holds by inflicting pain is impractical, also. It may work in practice, but a desperate man fighting for his life will not be affected by such methods.

The following release methods are effective, and it is advisable to be familiar with them, but the use of the proper approaches will lessen the danger of your being placed in such a position that the release methods will be required.

Each of these methods is followed by the proper turn, getting subject in horizontal position and starting the carry. In breaking holds, let yourself be submerged with subject, performing the break under water. This is done because a drowning person releases a hold more readily under water, his constant desire being to climb to the surface to obtain air. Utilize this tendency to escape.

Front Strangle Hold.[1]—You are grasped tightly around the neck from the front, subject's head over your shoulder.

If subject's head is over your right shoulder, put your right hand on his right cheek and push his head toward your right; and at the same time put your left hand on subject's encircling arm above the elbow and lift, following through—pushing toward the right. Then duck under this arm as you raise it, and continue pushing with both hands until subject is turned with back to you. Proceed as in rear approach.

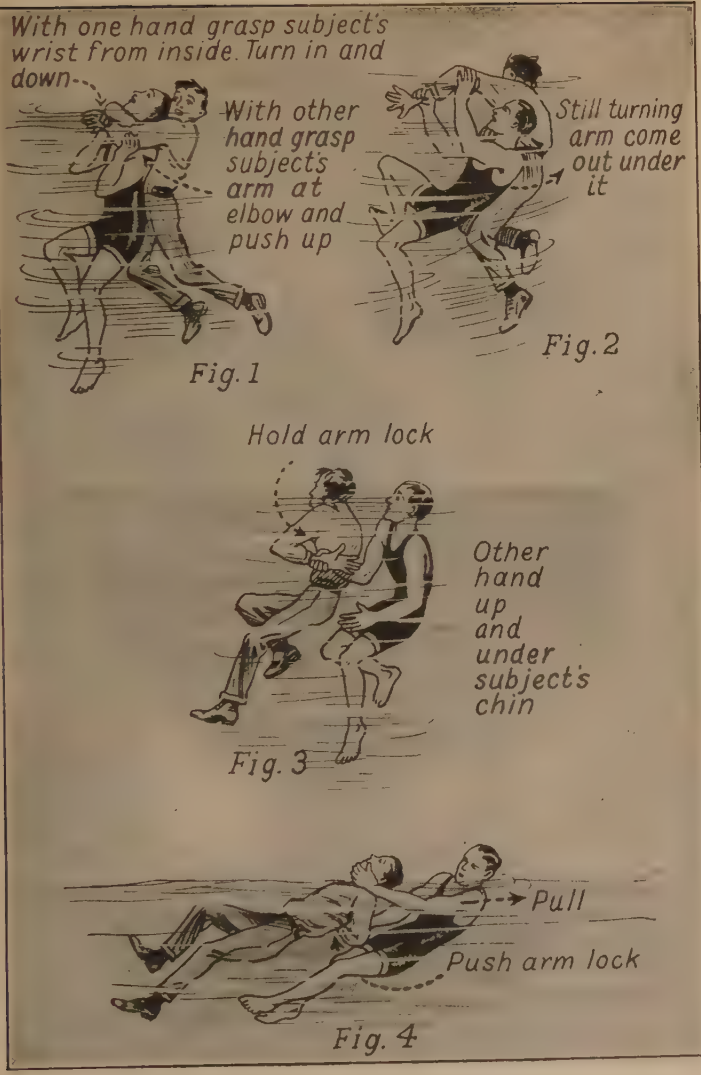


If subject's head is over your left shoulder, use your left hand on his left cheek, and your right hand to lift his left arm.

Demonstrate twice in each of the two positions above.

Back Strangle Hold.—You are grasped tightly around the neck from the back. Grasp subject's lower hand and *twist* it down and in toward his body. With your other hand, grasp his lower arm at the elbow and *push up*. *Duck under* this arm as you raise it, and continue twisting his hand until he is turned back to you, and his arm is in hammer lock

[1] The efficiency of this method depends on the snap with which it is executed. Practice it slowly until you have the technique mastered, then perform the *push*, *lift*, and *duck*, all in one quick movement


With one hand grasp subject's wrist from inside. Turn in and down
With other hand grasp subject's arm at elbow and push up
Fig. 1
Still turning arm come out under it
Fig. 2
Hold arm lock
Other hand up and under subject's chin
Fig. 3
Pull
Push arm lock
Fig. 4

position, to raise hips. Use other hand for chin pull to get his body flat on surface and swim with hand that held wrist. Shift to cross chest carry.

If subject's left arm is the lower, use your left hand to raise his elbow and your right hand to twist his hand.

If subject's right arm is the lower, reverse the process.

Demonstrate twice in each of these two positions.

Double Grip on One Wrist.—Subject grasps your right wrist with both hands. Put your free hand on subject's farther wrist (crossing the grasped wrist). Retaining this hold, bring your left foot up, over subject's arms.

Place right foot against subjects' right arm pit and *push*, as you pull wrist. (Avoid kicking.)[1] When the grasp is broken, proceed as in surface approach.

If your left wrist is grasped, reverse the process.

Breaking Two People Apart.—Two people are clinging together in a front strangle hold. Swim to a point directly behind one of them, and place your hands on throat (Adam's apple); raise one foot over locked arms of subject, placing heel under chin of subject facing you, against his neck; straightening your leg, *push* hard, and pull, separating the two.[2] (Avoid kicking.)

Carry subject you are holding to safety.

To rescue a person who has broken through the ice: You should first tie a rope around your body and have the other end tied, or held, on shore. Then secure a long board, or a ladder, crawl out on this or push it out so that the person in the water may reach it. If nothing can be found on which you can support your weight do not attempt to walk out toward the person to be rescued, but lie down flat on your

[1] If you find that you are unable to reach subject's chest with your foot, due to your shorter reach, bend your elbow, until you can reach chest.

[2] In practice, subjects should be instructed not to resist this break, as it is possible to inflict injury if rescuer is required to use full force. Rescuer performing this break on subject under water will encounter less resistance.

face and crawl out as by doing this much less weight bears at any one point on the ice than in walking.

Symptoms.—Are of course those of suffocation. In addition a frothy fluid is often noticed in the mouth and nose and the body is cold.

Treatment.—Is naturally that of suffocation in general—artificial respiration. Also afterward necessary measures to restore warmth to the body.

In order that the proper treatment for drowning may be given promptly, the necessary directions should be posted at all boat-houses and bath-houses.

As soon as the nearly drowned person has been taken from the water loosen all tight clothing, at the same time send some one else for a doctor and for dry clothing and blankets when possible. Quickly clean mud or water from the mouth with a handkerchief on the finger.

Artificial respiration which is the essential treatment for drowning is described in Lesson VII. Artificial respiration should be started at once. Delay may cost a life.

At the same time that one or two persons are performing artificial respiration, without interfering with them, others should remove the patient's wet clothing and dry him with towels or something else, then cover him with a dry coat or blanket.

6. Shooting and Fishing

Shooting accidents are common and generally result from carelessness in the use of rifles or shot-guns.

Shooting

Prevention.—Never put a cartridge or shell into the chamber before you need it and always remove it when the need for it ceases.

Do not cock a gun except when you expect to shoot at any moment and uncock it when this necessity ceases. Never point a gun, whether loaded or unloaded, toward yourself or anyone else. Be particularly careful in going over or through fences, and in boats.

When hunting in company try to know where your companions are at all times and do not fire in that direction. Make sure in firing at anything in the woods that you are not shooting at a man.

Symptoms.—Wounds from rifles have already been described as punctured wounds. Wounds from shot-guns received near the muzzle are lacerated wounds with great destruction of the tissues and often actually tear off parts of the body. At a far distance shot may lodge just under the skin or may only produce a bruise with a stinging sensation.

Treatment.—For the trivial injuries which have just been mentioned the services of a doctor are never immediately necessary, though when shot has lodged under the skin, a doctor should always remove it, as blood-poisoning may follow attempts to do so by other persons.

With serious shot-gun or rifle injuries circumstances are usually such that a doctor cannot be obtained promptly, though one should be secured as soon as possible. A comrade of the injured man will, therefore, almost always be compelled to give necessary treatment. This does not differ in any respect from the treatment of such wounds due to other causes. The bleeding may be very severe, however

and must be checked at any cost, even if the wound will probably be infected in doing so. Shock always demands treatment.

Fishing

A fishhook caught in the flesh, if the barb is not engaged, is easily removed. If the barb is firmly fixed, however, quite the contrary is true. In this case the point of the hook should be pushed through till the barb has passed through and out of the skin. The barb should then be cut off with a strong pair of nippers. Such a wound should, when possible, be shown to a doctor, as it is very likely to become inflamed. If this occurs a doctor's services are always required. In any event, the wound should be put in hot water, which, if possible, has been previously boiled, and squeezed so as to wash out any germs which may have got in. Such a wound should never be sealed with collodion or plaster, but should be dressed with a surgically clean or antiseptic compress or bandage, without, or better with iodine.

7. Automobile

Automobile injuries are becoming increasingly common on account of the more general use of the automobile.

Such injuries are usually bruises, strains, sprains, dislocations, fractures or wounds, and are likely to be very severe and of a crushing or mangling character.

Prevention.—Every owner of a car should himself know or have some responsible person in his employ who is able to recognize whether his automobile is in fit condition to run with safety. Automobile accidents due to the most obvious defects in the mechanism of cars are far too common.

High speed, especially at night and on poor roads, is responsible for many accidents. Slippery roads demand especial care on the part of the driver, on account of the danger from skidding. The use of alcoholic liquors by drivers of automobiles is as dangerous if not more so, than similar indulgence on the part of locomotive engineers.

Grade crossings of railways should be approached by the automobilist with the greatest care, as accidents due to collisions with railway trains are very common.

The **Symptoms** and **Treatment** of automobile injuries need not be described as they are exactly the same as with similar injuries due to other causes.

Year by year deaths from the exhaust gas from automobiles are becoming more common. As is stated elsewhere this gas is carbon monoxide.

Four rules for protection against deadly effects of poisonous gas, carbon monoxide, always present in exhaust from gas-driven engines, have lately been issued by the the U. S. Bureau of Mines:

NEVER run automobile engine in closed garage; OPEN DOORS WIDE.

NEVER crawl under car with engine running, EVEN if car is in open air.

NEVER sit in closed car with engine running, EVEN if in a ventilated garage.

NEVER sit in closed car with engine running and all windows shut, EVEN if car is in open air; always have windows open.

8. Camping and Summer Outings

A number of not closely related injuries and emergencies will be discussed under this heading. None is peculiar either to life in camp or to summer outings, but they do occur more commonly under such conditions. As out-of-door active life is also not infrequently accompanied by injuries, such as bruises, strains, sprains, dislocations, fractures and wounds, these should also be studied in this condition.

This section comprises: Sunburn, Mosquito bites, Stings and Bites of Insects and Spiders, Poison Ivy or Oak, Plant poisons, especially Mushrooms, Bites of Snakes, Injuries of feet, Cramps in legs.

Sunburn

This may vary from a slight redness of the skin to a very severe burn. Persons with delicate skins may avoid a good deal of needless discomfort and pain by protecting themselves when exposed to the bright summer sun. That there is anything healthy in sunburn or tan is a wholly false idea. The measures of protection are naturally the use of hats and clothing which shade the face and body from the sun. Wetting the face, especially with salt water, is likely to cause very severe sunburn. Any toilet powder will protect the face from the sun's rays to some extent.

The treatment consists of soothing applications; ordinary or carbolized vaseline may be used. An excellent application and one easily prepared is 1 part of lime-water, 3 parts almond or olive oil. Salt and vinegar has been found to prevent sunburn and also to relieve the burning due to the sun. It must not be used if the skin is broken.

Mosquito Bites

These injuries are usually regarded as of trivial importance, but it is well to remember in malarial districts that malaria is caused by mosquitoes and that to prevent this disease mosquito nets and other means of protection against them should be used.

Ammonia is the best remedy, as the poison is an acid one. Lime-water with two drops of carbolic acid to the ounce is also good. Menthol and toilet powder often give temporary relief.

Stings and Bites of Insects and Spiders

These are rarely dangerous to life, though they may cause a great deal of pain and discomfort. Nothing need be said in reference to prevention or symptoms. Ammonia should be immediately applied to the part where the sting entered; this should be removed if it remains in the wound. Afterward cool, wet dressings should be used. Cloths wet with

water in which a very few drops of carbolic acid have been thoroughly mixed, and wet salt are good applications.

Poison Ivy or Oak

These plants, which so commonly cause skin poisoning, belong to the sumac family. Two varieties are described—one, a shrub or small tree, with oval, pointed leaves arranged in clusters of from seven to thirteen on a common stalk; the other is a creeper or a climbing plant with broad leaves, sometimes slightly notched, arranged in clusters of three. Both have berries.

These plants cause poisoning in almost every one if touched, and some persons can scarcely go near them without being poisoned. Early in an attack a person may convey the disease from one part of his body to another, and extremely rarely one person infects another.

Prevention.—Is naturally avoiding poison ivy or oak. Remember there is no certainty that if you have handled these plants at one time without injury that the same will be true on another occasion.

Symptoms.—Are those of a severe inflammation of the skin. This, of course, appears more often on the exposed parts, usually the hands and arms and the face. The skin becomes much inflamed and swollen, blisters form and even pus sometimes. There may be loss of the upper layers of the skin and a red, weepy surface. The pain, itching and discomfort are severe. The symptoms, as a whole, are very violent.

Treatment.—If severe, a doctor should be consulted promptly. A very good and simple treatment is a wash of a two or three per cent boracic acid solution followed by the ordinary zinc ointment. Lime-water for the wash and carbolized vaseline for the ointment are fairly good remedies. The ointment should be washed off daily with the wash, the part dried gently and the ointment reapplied. An old household remedy is made by putting a copper cent in vinegar.

Lately, a saturated solution of Epsom salts has been highly recommended.

Plant Poisons, Especially Mushrooms

A number of the common plants are poisonous. Among them are Bitter Sweet, Deadly Night Shade, Mountain Ash, Hemlock, Hellebore, Jamestown Weed, Wild Parsley and Lettuce and certain Mushrooms and Toadstools. Cases of poisoning, except from the last, are rare.

A rule which should always be observed is never to eat anything growing unless you are very sure that you know it is not poisonous and to prevent children from doing so.

Mushroom, sometimes called toadstool poisoning, is commonly due to failure to distinguish between the poisonous and non-poisonous varieties.

The rules which are commonly accepted for doing so are as follows:

Consider dangerous all mushrooms which have:

1. "A cup-like formation at the base of stem (so-called death cup)."
2. "A scaly or close-fitting layer at the base of the stem."
3. "Loose warts on the cap."
4. "A milky juice (unless this is red)."
5. "Great brittleness, with gills nearly all of equal length and the flesh of the cap thin."
6. A honeycombed appearance of the gills, if the flesh tastes bitter, or the mouths of the tubes are reddish, or the flesh changes color when cut or bruised."
7. "A cobwebby veil or ring when the plant is young."
8. "A slimy cap and clay-colored spores" (Dulles).

Moreover, all mushrooms that are decaying or are in the immature button stage should be discarded.

Symptoms of Poisoning from Growing Plants.—Nausea and vomiting. Severe pain in abdomen. Great depression. Unconsciousness, sometimes, weak pulse, shallow respiration. Delirium from some poisons.

Treatment.—Send for doctor. Cause vomiting. Stimulants. Rest in lying-down position, with head low. Cover warmly and apply heat by means of hot bottles.

Snake Bite

This subject is discussed on page 88.

Injuries of the Feet

The pleasures of a camping trip which requires much walking depend to a great extent on the condition of the feet.

The importance of well-fitting shoes cannot be overestimated. The shoes should have heavy soles, moderate heels and be neither tight nor loose though they should be tightly laced and longer than the feet. New and stiff shoes are almost sure to be very uncomfortable; shoes should be worn sufficiently beforehand so that they will have adapted themselves to the shape of the feet. Wool is the best material for the socks or stockings and they must be long enough so that the toes have free play. Great care should be taken to have any darns smooth. The feet should be carefully washed and dried after a day's walk and clean socks or stockings should be put on. If the feet are swollen or hot, wash them with warm salt water or alcohol before putting on fresh hose. Talcum powder will prevent foot troubles. In the morning dry the feet thoroughly, rub on the powder and shake a good amount in each shoe.

Blisters are best treated by washing the foot thoroughly in hot water, then taking a clean needle and pricking the blister, not directly, but through the skin at the side, and gently pressing out the fluid in the blister till it is flat.

To toughen and harden the feet soak them for some time in a bowl of cold tannic acid solution, a tablespoonful of the acid to a bowl of water. A solution of alcohol and salt answers the same purpose.

Cramps in Legs

Cramps in the leg-muscles often come on after unusual exertion. They are best treated by rubbing and kneading the muscles. Wrapping the legs in hot cloths will also assist.

Medicines

While the first aider is supposed to make all possible use of material which is found at hand there are certain articles which cannot be improvised. Every home, even if it be in a city with drug stores handy, should be provided with a few simple remedies and surgical dressings. This is especially necessary in every household where there are children, as little people are so likely to hurt themselves and are much more liable to sudden illness than their elders.

Numbers of medicine cabinets are on the markets but in few, unfortunately, have the contents been selected with practical knowledge of the needs and limitations of the first aider. Some contain drugs which should never be prescribed except by a physician. This objection does not apply to the Red Cross Home Cabinet which has only the simple, safe remedies that are recommended in this book. There is no good reason, however, why you should not purchase your own supplies and make up your own cabinet. It is believed that all medical supplies should be put in some sort of box as otherwise they will be lost and wasted and what is even more important cannot be found in time of need. Hanging cabinets are more convenient as by opening the door all the contents may be seen at a glance. They are, however, more difficult to make as cross partitions must be put in. It may, therefore, be better in some cases to use a box in which the contents may be placed on the bottom with a view to putting it on a convenient shelf. Either a wooden or tin box may be used for the latter but if a hanging cabinet is to be made a wooden box will be found more suitable on account of the partitions. In any case the box

had best be painted inside and out with white enamel paint. It is also better to provide a lock and key.

Do not make your medicine box too small; it is well to leave space for medicine prescribed by a doctor in illness so that they may be put away in a safe place. This does not mean, however, that medicines which have served their purpose should be kept. The sooner they are got rid of the better.

It is best to select a standard size of bottle. The two-ounce square bottle will generally be found most convenient. The few drugs which will be required in larger quantities may be put in two bottles.

The supplies suggested for the household medicine box are as follows:

Witch hazel, 2 ounces.
Aromatic spirits of ammonia, 2 ounces (rubber cork).
Olive oil, 2 drams
Epsom salts, 4 ounces (or half dozen Seidlitz powders).
Lime water, 2 ounces.
Mustard, powdered, 2 ounces.
Syrup of ginger, 2 ounces.
Syrup of ipecac, 2 ounces.
Witch hazel, 4 ounces.
Bismuth subnitrate tablets, 5 grain (100 tablets in bottle).
Carbolized vaseline or petrolatum, 1 tube.
Oil of cloves, 1 dram bottle (labeled "poison").
Soda mint tablets, 100 tablets in bottle.
Talcum powder, 1 tin.
Antiseptic gauze, 1 small package.
Absorbent cotton, ½ pound.
Roller bandages, gauze, 6, 3 large and 3 small.
First-aid outfits, Red Cross, 2.
Collodion; 1 small bottle with brush.
Tooth plasters, 1 box.
Corn plasters, 1 box.

Glass and spoon, 1 each or medicine glass, 1.
Scissors, 1 pair.
Pins, ordinary and safety.
Iodine, one-half tincture with one-half alcohol, 2 ounces in bottle, rubber cork or;
Iodine swabs, 6.
Bottle, 2 ounce, 1.
Camel's hair brush, 1.

Many years ago the demand for good First Aid boxes led to the designing of certain boxes by the First Aid Department of the American Red Cross. A great deal of attention was given to adapting each of these boxes to the particular need of the first aiders who were going to use it. These boxes are sold practically at cost. On the other hand it is perfectly practical to make a simple First Aid box which will be satisfactory up to its capacity.

HOW TO MAKE A FIRST AID BOX[1]

This Lesson shows how to make a simple First Aid Box. Such a box comes in handily in meeting the numerous accidents arising in a home. It can be kept on the kitchen shelf, or out in the garage or work shop, ready for any emergency.

Material.

Use a square tin can, such as a tobacco can or cracker tin, with a tight fitting cover. A round can, such as a coffee or baking powder can, will do; however, a square tin is preferable because it is easier to pack. It is important that the receptacle should be air-tight and large enough to hold the necessary First Aid material; it should be at least 5″ in diameter and preferably larger.

Three coats of white flat paint, or two coats of flat paint finished with white enamel (bathtube enamel will answer

[1] This is quoted from "The American Red Cross Teachers Handbook of First Aid Instruction."

the purpose) may be used for covering the tin. Use a small brush in applying the paint.

Directions for Making.

1. Wash the can thoroughly, removing all paper, glue or old paint; dry it.

2. Apply one coat of the white paint; allow to dry.

3. The next day apply a second coat of paint, and the following day the enamel or the third coat.

4. When the box is ready, place in it the following material:

2 Triangular bandages
2 Roller bandages
2 Packages of dressings
1 Small roll of absorbent cotton
½ Ounce Iodine (use rubber cork in the bottle)
1 Ounce Aromatic Spirits of Ammonia (use rubber cork in bottle)
2 or 3 Safety pins
Small scissors
American Red Cross First Aid Text Book, General Edition.
List of contents to be pasted on inside of cover of First Aid Box.

Note.—A red cross should be pasted on the front of the box when the First Aid course has been completed and the examination satisfactorily passed. The instructor will award this red cross at the same time as the certificate.

The supplies for a camp should be about as follows:
Aromatic Spirits of Ammonia, 2 oz. bottle, rubber cork.
Syrup of Ginger, 2 oz.
Seidlitz Powders, 12 in tin box.
5 gr. Bismuth Subnitrate tablets (100).
Carbolized Vaseline, 1 tin.
Oil of Cloves, 1 Drachm bottle, labelled "Poison."
Soda Mint tablets, 50.
1 Tin Talcum Powder.
1 Small package Antiseptic Gauze.

2 Red Cross First-aid Dressings.

Iodine, 2 ounce bottle of the tincture made half strength by mixing with an equal quantity of alcohol, or better Iodine swabs.

1 box Tooth wax.

1 box Tooth plaster.

1 Camel's Hair Brush.

1 box Corn plaster.

1 Sharp knife.

1 Pair scissors.

Needles and pins, ordinary and safety.

QUESTIONS

1. What are the dangers of self-medication?
2. How would you care for a cold?
3. What are the commonest causes of colic?
4. How would you care for colic?
5. Emergency treatment of nausea and vomiting?
6. Emergency treatment of hiccough?
7. How would you care for chill from exposure to cold?
8. How would you know that a child had convulsions? What would you do?
9. Emergency treatment of tooth-ache?
10. Emergency treatment of ear-ache?
11. What would you do for a stye?
12. How would you prevent and care for sunburn?
13. Emergency treatment and prevention of prickly heat?
14. How would you recognize poison ivy and poison oak?
15. Emergency treatment for ivy poisoning?
16. Emergency treatment of mosquito bites?
17. What are chilblains due to and how would you prevent and care for them?
18. Prevention and emergency treatment of corns?
19. What are the common poisonous plants?
20. Emergency treatment of mushroom poisoning?

PRACTICAL EXERCISES

General review. As part of this review tell what each article in the medicine box is used for and in what quantities.

LESSON X

CARRYING AND HOME PREPARATIONS FOR SICK AND INJURED

1. Carrying. 2. Lifting into Bed. 3. Selection and Preparation of Room. 4. Selection and Preparation of Bed. 5. Removal of Clothing. 6. Position in Bed. 7. Preparation for Doctor.

Of course the object of the first aider is not only to give the necessary immediate treatment but to get sick and injured into the hands of a doctor in the best possible condition or, in case the services of a doctor are not needed, to their homes or to some other safe place. Likewise one of the most important things to be considered and determined is whether or not a doctor is required. This question has, however, been discussed at length in connection with different injuries and illnesses and will not again be referred to here.

It is clear that much of the good coming from first aid treatment will be undone if one does not know what to do for a person after his injury has been cared for.

1. Carrying

You should know how to carry an injured person even though you do not expect to have to use this knowledge.

Whatever method of transportation is adopted, first aid should be given before it is attempted and when necessary the clothing should be loosened so that it will not constrict the neck, chest or abdomen during transportation. Clothing should not be removed, however, as this will increase shock and as injured persons almost always feel chilly as

the result of shock they should when possible, be covered with a blanket or rug.

All serious cases of illness or injury should be carried on stretchers when it is possible to procure or to make them and when in doubt as to the severity of an illness or injury it is always much safer to so carry. The ordinary stretcher is so well known that it is hardly necessary to describe it. This stretcher has two long poles with a bed, usually of canvas, between them and cross-pieces to keep the long poles apart and thus to stretch the canvas. The poles are long enough to give the bearers handholds at each end of the stretcher. Fairly satisfactory stretchers may be made from materials which are usually easily procured. One of the easiest to make is the coat stretcher. For this two coats and a pair of poles are required. The sleeves of the coats are first turned inside out and the coats are then placed on the ground with their lower edges touching each other. The poles are passed through the sleeves on each side, and the coats are buttoned and the buttoned side turned down. (Figs. 55 and 56.)

Another convenient way to make a stretcher is shown in Figs. 57 and 58. Two poles and a large blanket, rug or strong sheet may also be used to make a stretcher. The blanket, rug or sheet is spread on the ground and the poles are placed on the edges of the long sides. These edges are then rolled on the poles until a distance of about 20 inches, that necessary for the shoulders of the patients, is left between them. This stretcher may be turned over before being used and especially with narrow blankets, rugs or sheets it is much safer to bind them to the poles with twine. With both these stretchers, except when it is only necessary to go a short distance it is desirable to tie on two pieces of wood for cross-pieces so as to prevent the poles from being forced together when the weight of the person to be carried is put on the stretcher. Bags and sacks may also be used for stretcher beds. The bottoms should be torn so that the poles may be passed through a number suffi-

FIG. 55.—Pole and coat stretcher. Pulling coat on the poles.

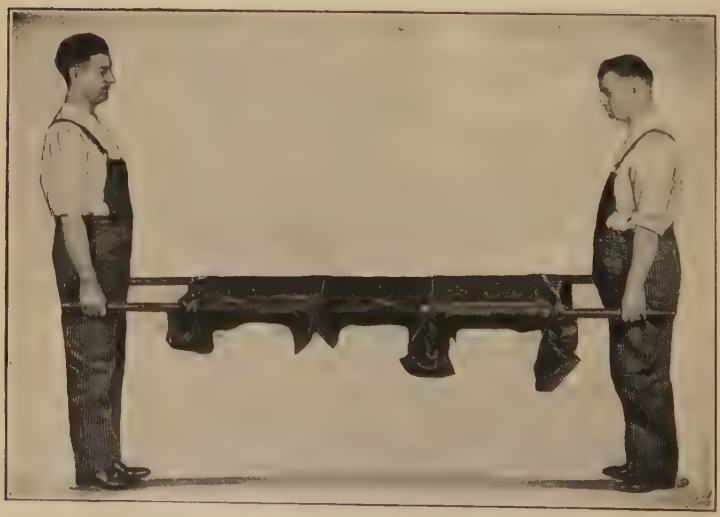


FIG. 56.—Pole and coat stretcher complete.

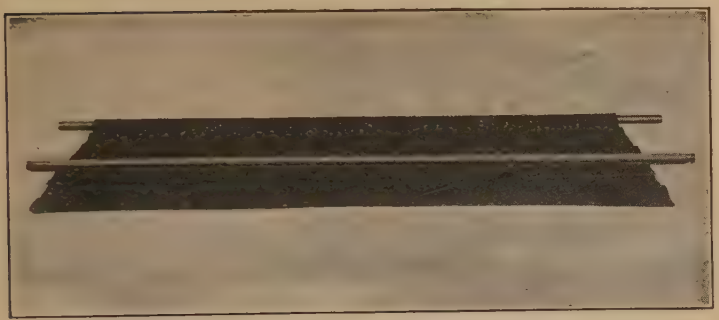


FIG. 57.—Pole and blanket stretcher. Folding blanket over poles.

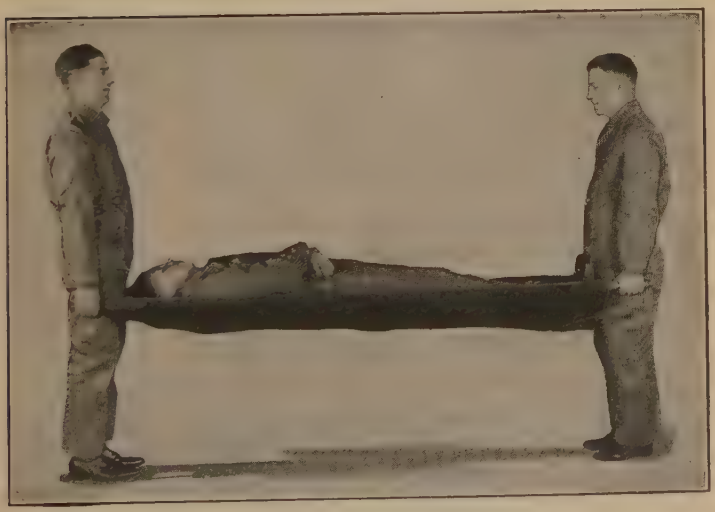


FIG. 58.—Pole and blanket stretcher complete.

cient to give the length of stretcher bed required. These and similar stretchers should be tested by lifting an uninjured man before they are actually used. Great care is also necessary to guard against accidents during transportation.

Numbers of other articles may be used for stretchers in case of necessity. Such articles are doors, window shutters, boards, bed-frames, benches, ladders, mattresses, blankets, rugs, sheets, and mats. It should be remembered, however, that these have a disadvantage as compared with those which have been described above. The former, with care, requires but two bearers to carry the injured man, while for the latter four must always be employed. Four, especially if they are untrained, can never work together as well as two, so with four bearers a person will be jolted more with an increase of suffering and possibly further injury.

Whatever the kind of stretcher used, the greatest gentleness should be employed in putting one on it, in carrying, and in removing him when he has reached his destination. To effect this the bearers must work together in all these movements.

Four bearers are required, though but two do the actual carrying. For them select strong, sturdy men of about equal height. They should be intelligent in order that they may understand your directions. Don't be afraid of spending a little time in explaining just what you want done, you will save in the end. First have one of the bearers bring the stretcher close to the injured man but not so near that it will interfere with lifting him. The most convenient place for the stretcher will be about 2 feet from his head in line with his body. Then have three bearers take position on one side of the person to be carried and one on the other side. If he is not on his back the single bearer should be directed to put him in that position. Of course, it is understood that first-aid treatment has already been given. The proper places for the bearers are, the single bearer opposite the hips, one of those on the other side also at the

hips between the other two, one at the shoulder and one at the knees. At this time it will be well to explain no movements are ever to be made until you give the word. Now, have all four bearers facing the injured person kneel on the knees nearest his feet. Have the single bearer and the man opposite him pass their arms under his back and thighs, the man at the shoulder puts one arm under his shoulders and the other under his neck to the further shoulder so as to support the head, at the same time the man at the knees places both arms under the legs. Ask the bearers if they are ready and then say "Lift." Then the bearers must all lift together and place the man on the knees of the three bearers who are in line. These, of course, form a firm bench. As soon as he is safely in position, the single bearer should be told to leave him and to get the stretcher and put it under him against the other bearers' ankles. The single bearer should then put his arms under his back and thighs as before. Ask again if the bearers are ready and give the word "Lower." He is then gently lowered to the stretcher. (See Figs. 59 and 60.)

Next, have one bearer take position between the stretcher handles at the front and another at the rear. Direct them to stoop and to take hold of the handles but not to lift until you give the word "Lift." Then they rise and stand erect. They should not move forward, however, till the word "March" is given. Then the bearer at the front steps off with his left foot and the bearer at the rear with his right foot so as to break step. This will jolt the stretcher much less than though the bearers are in step and if they take short steps instead of long ones this will help in the same way. Always carry a person feet first except when going up a hill or upstairs when he should be carried head first, the stretcher being kept as level as possible. The two bearers who are not carrying the stretcher march at its sides to give any needed assistance and, of course, finally to help remove the injured man. The motions are reversed in removing one from a stretcher.

FIG. 59.—Lifting injured person preparatory to placing on stretcher.

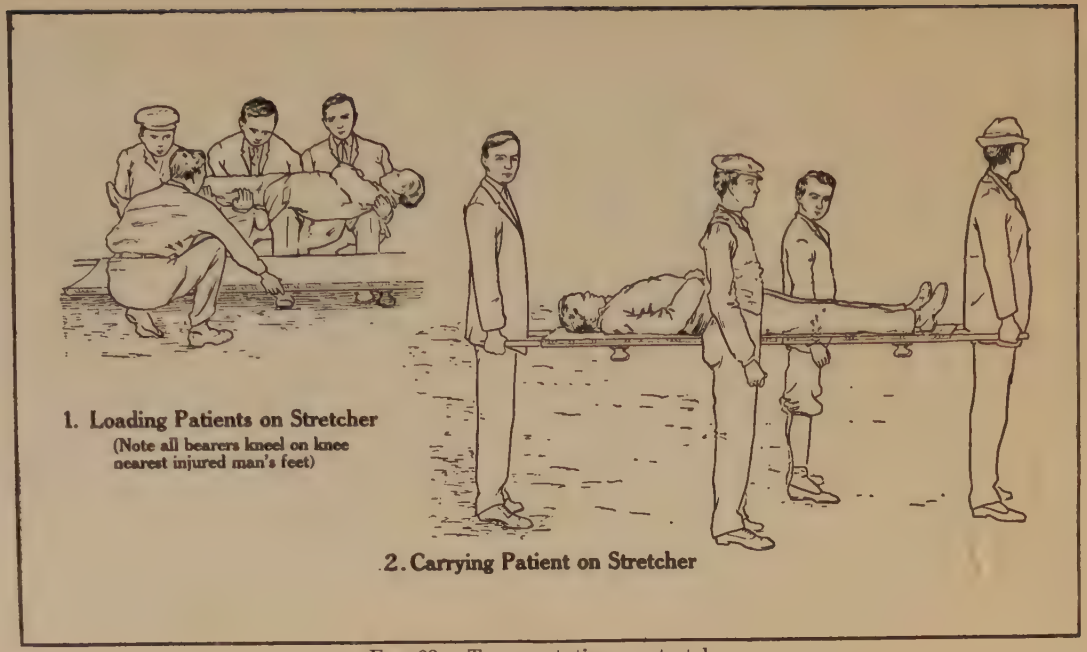

1. Loading Patients on Stretcher
(Note all bearers kneel on knee nearest injured man's feet)
2. Carrying Patient on Stretcher

FIG. 60.—Transportation on stretcher.

When four bearers must be employed everything is done in the same way except that four instead of two men carry the stretcher.

Generally speaking, the bearers should take the shortest course in carrying to destination, but it is much better to go around all obstacles than over them as this will jolt the man less.

Explain to the bearers that you will tell them where you wish them to stop; but after doing this they are not to lower the stretcher until you give the word "Lower." Then the stretcher should be gently lowered to the ground.

As explained above, in carrying anyone upstairs or uphill he should go head and not feet first. To do this without confusion it will be best to stop the stretcher at the foot of the hills or of the stairs, as the case may be, and to lower it to the ground. Then have the bearers face in the opposite direction, lift the stretcher, turn it around slowly and then go up the hill or stairs.

Of course, the position of anyone on a stretcher should be such that his particular injury will receive no further hurt. Usually it will be best to make a pillow from a folded coat but if the injured man is very faint or has lost a great deal of blood he is safer without the pillow.

A convenient method of carrying a person without a stretcher is to seat her, and this is particularly well adapted for women, in a strong chair and have two bearers lift the chair, one at the front and the other at the rear. The chair should be inclined backward so that she is almost in the lying-down position.

One able to sit up and steady himself by placing his arms around the bearer's necks may be carried in the "Lady's Chair." To form this each bearer should grasp his left wrist in his right hand and the other bearer's right wrist in his left hand with the knuckles uppermost. The bearers then stoop and place the "chair" under the person who steadies himself by placing his arms around their necks.

By one bearer

A single bearer may carry a person in his arms or on his back.

1. In arms

The bearer, after turning man on his face, steps astride his body, facing toward his head, and with hands under his armpits lifts him to his knees; then clasping hands over abdomen, lifts him to his feet; he then with his left hand seizes the individual by the left wrist and draws arm around his (the bearer's) neck and holds it against his left chest, the left side of the man being carried resting against his body, and supports him, with his right arm about the waist.

From this position the bearer, with his right arm upon the man's back passes his left under thighs and lifts him into position, carrying him well up. (See Figs. 61 and 62.)

2. Across back

The injured man is first lifted erect as described in previous paragraph, when the bearer with his left hand seizes the right wrist of the person and draws the arm over the head and down upon his left shoulder, then shifting himself in front, stoops and clasps the right thigh with his right arm passed between the legs, his right hand seizing the person's right wrist; lastly the bearer with his left hand grasps the man's left hand and steadies it against his side. when he rises.

The injured man is lifted erect (as described), when the bearer shifts himself to the front of the man, back to him, stoops and grasping his thighs, brings him well upon his back.

As the injured man must help himself by placing his arms around the bearer's neck, this method is impracticable with an unconscious man.

In lowering from these positions the motions are reversed. Should the man be injured in such a manner as to require these motions to be conducted from the right side instead of left, as laid down, the change is simply one of hands—the motions proceed as directed, substituting right for left and *vice versa*. (See Fig. 63.)

FIG. 61.—Lifting to knee for carrying in arms.

FIG. 62.—Carrying in arms.

Fig. 63.—Carrying on back or "pick a back."

By two bearers

One bearer takes position between the legs and the other at head, both facing toward feet. They then lift the injured man.

2. Lifting into Bed

It is somewhat easier to do this with a narrow bed as with this the bearers can work on both sides in lifting, carrying, and lowering the injured person. With a narrow bed have the loaded stretcher, person carried head first, brought to the foot of the bed and in line with it. Then have the bearers raise him on their knees just as though they were going to lower him to the ground. After the single bearer has removed the stretcher he will return to assist. When his arms are in position to do this, the word "Rise" should be given, then the bearers all supporting the injured person will rise to their feet and carry him to the bed, side stepping on each side, thus passing him over the foot-board. When in proper position he should be gently lowered to the bed and the bearers remove their arms.

If the bed is too wide for this method to be adopted or if there is not space to place the stretcher in line with the bed at its foot a slightly different plan must be followed. For this the loaded stretcher is placed at the side of the bed and the injured person is raised in exactly the same way, the stretcher, of course, being taken out of the way. After the single bearer has assisted in raising him, however, he steps to one side and the other three bearers carry him forward over the side of the bed.

3. Selection and Preparation of Room

Generally speaking, one's own room is best. This is because anyone will usually be better contented there and will not worry himself by desiring a change, a matter of some importance is serious disease. In severe injury, however, it may not be possible to take a person to his

Fig. 64.—So called fireman's carry.

FIG. 65.—Carrying by two bearers. Placing the hands and arms.

FIG. 66.—Carrying by two bearers. Showing injured person in position.

FIG. 67.—Dragging method of taking a person from a gas or smoke filled room.

own room on account of the difficulties presented by narrow passage-ways or steep stairs. The room selected must, of course, be free from these objections but, if possible, it should not be a ground-floor room, as such rooms are likely to prove noisy and do not afford the privacy desirable for persons in serious condition. In illness, if one's own room is unsuitable for some good reason, it is best to choose a room as far separated as practicable from other members of the family. This is particularly the case in contagious diseases when the well should never be endangered by the sick if it can possibly be prevented. A room on the upper floor is better for such cases for two reasons. Well people are less likely to enter it and all the currents of air in a house are upward. A toilet nearby will save many steps in serious illness or injury and will also be safer in cases of contagious disease.

If one must be carried to his sick room on a stretcher, the way to it should be cleared previously by removing furniture and loose rugs over which the bearers might trip.

All useless articles should be removed from the sick room. These include furniture, clothing and hangings, also most if not all of the pictures from the walls. Judgment must be shown in doing this, however. Persons not seriously ill or injured will enjoy having their belongings about them. This is not the case if the condition is serious and everything useless makes more work. Moreover, the delirious brain is likely to twist almost everything into some horrible shape. The furniture of the room in contagious disease should consist of the bed, a small plain table, two chairs without upholstery and the window shades. In preparing the sick room be particularly careful not to stir up the dust.

The room should not be dark but the shades should be arranged so as to exclude the glare of the sun.

4. Selection and Preparation of Bed

A narrow, high bed is to be preferred and should always be used if available. In the first place it is easier to lift one

into a narrow bed and in the second it is much more easy to care for anyone in such a bed. If it is high in addition much stooping over is saved. The bed should be drawn out from the wall so that it may be easily reached from all sides.

A firm mattress is much the best. Two fairly hard pillows should also be provided. The lower sheet should be smooth and it had best be kept so by safety pins at the sides of the mattress. Over this in serious illness or injury a draw sheet should be placed. This is an ordinary sheet so folded lengthwise that it will extend from the middle of the patient's back to his knees. It should be pinned in place like the lower sheet. While it may be necessary to put a piece of rubber sheeting under the draw sheet in order to protect the bed do not use this unless it is really needed as it is likely to prove hot and uncomfortable. The top covering should consist of a sheet and ordinarily of a double blanket. The upper covering should be turned well back. Extra sheets and blankets should be ready at hand. It is well to have hot-water bottles and hot blankets ready, especially if the person has been injured or there is likely to be a great deal of shock. If they are used to heat the bed the covers must, of course, not be turned back till immediately before the person is put in bed.

Special preparations are often necessary for fractures of the thigh and leg. Two or three boards are sometimes put under the mattress to prevent bending of the bone at the place it is broken. Bed cradles, as they are called, are also used to support the weight of the bed clothes. A band-box with a hole cut through for the leg or a stool are sometimes used for this purpose or a piece of twine may be run through the bed covers and tied to the foot of the bed or to a nail in the wall.

When there has been a great deal of blood lost it may be necessary to raise the foot of the bed. A couple of soap boxes will answer well for this.

5. Removal of Clothing

Something has already been said on this subject but it will perhaps be better to repeat this in part here. The principle which should govern our actions in this respect is to think first of the injured person and second of his clothes. In serious cases clothes should be cut freely rather than to run risk of further injury by trying to take them off. In ripping up a seam in clothing always take the seam which can be most easily reached. For example, with the trousers the outside seam should be ripped. In undressing always draw out the uninjured limb first, but in dressing, dress the injured limb first.

In burns more damage will be done if care is not taken in respect to the clothing. Never pull the clothing off a burn or scald. Cut off all you can with a sharp pair of scissors and soak what remains with oil. Of course, the attention of the doctor should be called to this as soon as he arrives.

In injuries, the clothing is likely to be very dirty and it should be removed before the injured man is put into the clean bed. For this purpose he may be placed for the time being on another bed, a lounge or a table. To prevent soiling them they should be covered with newspapers and old sheets, or several thicknesses of newspapers alone do very well. If it is absolutely necessary to use the permanent bed it should be protected from dirt in the same way.

6. Position in Bed

This is governed, of course, by the same general principles which have been noted elsewhere. That is to say, if one is pale or feels faint or has lost much blood do not give him a pillow but make him lie flat. It is in such cases that the foot of the bed should be raised.

When his face is red raise his head on a pillow.

7. Preparations for Doctor

The first thing to make sure of is that the doctor will come with sufficient knowledge of the condition of his patient to

bring whatever may be necessary and thus save valuable time. In this connection we are, of course, considering injuries especially and not diseases. Communication with the doctor by telephone is best as this will enable him to make necessary inquiries. If this is not practicable send a written message. However you communicate with the doctor try to be as clear in your statements as possible.

Very probably if you talk to the doctor over the telephone he will tell exactly what preparations he wants made. Then all responsibility is off your shoulders if you carry out his directions to the letter and this should, of course, always be done. Suppose, however, preparations are left to your own good judgment. Remember, first, that there will probably have to be an examination of the patient so the room should be warm in order not to increase shock from chilling of his body. If there is a serious wound for which you think some kind of an operation will have to be performed it will save a great deal of time if you will get a room ready for this. In the first place you want a good light, a north light if possible. Then you will require a table. An ordinary kitchen table well scrubbed with soap and water will do very well. Another small table will be needed for dressings, etc. It is better not to try to clean the room you have selected for an operating room as this will stir up the dust. On the contrary leave it strictly alone and do not allow people to enter it for this will raise the dust. If the doctor wants anything special done to the room his wishes may be carried out while he is preparing for the operation.

When an operation will probably be required you will need plenty of hot and cold water and the greater part of this should have been boiled for ten minutes so you must start boiling water as soon as possible. Do not remove that which has been boiled from the vessels containing it but put aside the greater part of it to cool in them as soon as it has boiled ten minutes. You will also need several basins. After making them perfectly clean they should be rinsed out with boiling water and not wiped but put aside for use just as

they are. At least a dozen clean towels, and soap should also be provided. A pail or slop bucket will answer well enough for the waste water.

The preparations for a large dressing are about the same as for an operation. When smaller wounds require dressing this may often be done in the patient's bed. The preparations in other respects should be the same and some kind of waterproof cloth should be provided to protect the bed. Except in the cases mentioned it will hardly be worth while to make special preparations for the doctor's first visit unless he directs that this be done. For later visits you will learn from him what will be required.

QUESTIONS

1. Show what you would do and say if you were called upon to direct four men to carry an injured person on a stretcher.
2. How would you have an injured person carried upstairs?
3. How should a person be lifted from a stretcher to a bed?
4. Describe different methods of carrying without a stretcher.
5. What points would you take into account in selecting a sick room?
6. What sort of a bed would you choose and how would you get it ready?
7. How would you remove the clothing from a seriously injured person?
8. In what position should the person be put in bed?
9. What sort of a message would you send to a doctor if an injured person had been brought to your home?
10. What preparations should you make before the arrival of the doctor?

PRACTICAL EXERCISES

Practice in carrying. This may actually be done if you have a light boy for a subject but in any event the necessary motions may be satisfactorily demonstrated. When practical the preparation of the bed and lifting into it should also be demonstrated.

The best exercise will be to describe some injury and to tell the members of the class to do everything necessary till the injured man is in bed.

APPENDIX

American Red Cross First Aid Instruction Classes

The primary or standard First Aid course consists of not less than ten lectures and demonstrations of one and one-half hours each, or a total of fifteen hours instruction. Shorter lectures may be given at the discretion of the instructor and for the convenience of the members of the class, provided the fifteen hours are made up by increasing the number of lectures.

Classes may be formed of individual members of communities, social or other organizations, in industries, high or preparatory schools, colleges and universities, and among teachers in summer normal schools and institutes. Arrangements for organizing classes should be made with the nearest Red Cross Chapter, the First Aid Committee of which will gladly furnish any information about the course in addition to that which is given in this pamphlet, and assist in every way possible.

If, however, there is no First Aid Committee in a near-by Chapter, application should be made direct to the proper Division Office. For information concerning the courses of instruction in schools, the qualification of teachers, the place in the curriculum, time allotment, etc., see pamphlet entitled: *First Aid Instruction in Schools*, A. R. C. 1006.

Class Members.—It is desirable that a class be small rather than large, as individual instruction in practical work must be given each student. A class should have not less than eight nor more than twenty-five members. The minimum age limit is sixteen years, except in schools where the age limit may be lower. Membership in the Red Cross, while desirable, is not obligatory.

Class Secretary.—The class should elect a Secretary to handle the funds of the class, and represent it in all business with the Chapter.

Class Instructor.—Class instructors must be physicians who are graduates of recognized medical schools and who have received the degree of Doctor of Medicine. All instructors and examiners should be in good standing with their local or State medical society. The class may nominate its instructor, subject to the approval of the Chapter, or the Chapter will assign the instructor, if the class so desires. When sending in the name of a physician for instructor, it is necessary to furnish the physician's full name and address, the name of the medical college from which he graduated and the year of graduation. If the physician's credentials are found to be satisfactory, or if he is already a qualified instructor, a Certificate of Appointment will be issued to him by the Division Director of First Aid, and the class Secretary will be notified of his assignment to the class.

Class Roll.—A blank Class Roll will be sent, in duplicate, to the Secretary at the time the Secretary is notified of the instructor's assignment. The Class Roll should be filled out by the Secretary in accordance with the directions on the form, and must be forwarded to the Chapter before the third lecture is given.

Class Fees.—Any charge that may be made by the class instructor is a matter to be arranged between him and the class. The Red Cross approves of instructors donating such time as they may be able to give to First Aid work, or of making a reasonable charge for instructing the classes, but it prefers not to give advice relative to the amount of such fees.

Classrooms and Equipment.—Where the Chapter cannot provide a general classroom, it will assist the class in every way possible to secure a suitable meeting place. While not obligatory, it is recommended that each student of the class obtain a copy of the *American Red Cross Textbook on First Aid.* Each class should have an Instruction Outfit, a set

of Anatomical Charts, and a set of First Aid Charts. These supplies are described in detail in this pamphlet. A. R. C. 1009.

Examination.—The class instructor may examine the class. At least two weeks before the date set for the examination, the class Secretary should advise the Chapter of the time when the lectures will be completed and request that a blank Examination Record form be sent, in duplicate, to the instructor. The names of the students will be entered on the Examination Record as they appear on the Class Roll. Only those students who have attended at least 80 per cent of the lectures will be eligible for examination, and it will be the duty of the class Secretary to keep a record of attendance in order to determine this. No student who has failed to pass an examination shall be eligible for further examination until another full course of instruction shall have been taken.

Students' Certificates.—Certificates will be issued to students who have attended at least 80 per cent of the lectures and have attained an average of 75 per cent or more in the examination. Certificates will be written from the names as they appear on the Class Roll; therefore it is important that the names be typed or printed on the latter exactly as it is desired to have them appear on the certificates.

Advanced Course and Medal

Students who have satisfactorily completed the primary or standard course in First Aid, and desire to continue the study of the subject, may take an advanced course which consists of five lectures and demonstrations, or as many more as the instructor may deem necessary, each session to continue one and one-half hours.

Students in advanced courses are expected to become proficient in First Aid treatment of fractures, dislocations, burns, wounds, hemorrhages, and in performing artificial respiration. The general edition of the *First Aid Textbook* is used in this course. Instructors will require students to

study the chapters of the book covering the foregoing subjects and will limit their class instruction to actual practical demonstrations, requiring each student to repeat the work demonstrated. Examinations in the advanced course are limited to practical demonstrations of the methods of treatment studied.

The instructor who officiated for the standard course may be obtained to conduct the advanced course without further authorization by the Chapter. If this is not practicable, a new instructor must be authorized.

The procedure as to securing and forwarding Class Rolls and Examination Records will be the same as for the standard course.

Students who pass the advanced course examination will be awarded a Red Cross certificate and a bronze medal, to which metal bars, with the year of passing engraved on them, may be added for subsequent study and examination. Study for the bars shall be drawn from the *American Red Cross Textbook on First Aid*, general edition, and shall be of the same nature as that outlined for the advanced course, but shall carry the student to higher degrees of proficiency in actual work. The selection of practical tests shall be made by the Chairman of the Chapter First Aid Committee or by the Instructor. The number of bars that may be added to the medal is limited to three. When a student has acquired a medal and three bars, he should be competent to cope with almost any ordinary injury.

Prizes and Awards

The Red Cross offers the following prizes for the best First Aid work performed during each calendar year:

First	$50.00
Second	25.00
Third	15.00
Fourth	10.00

Competition for these prizes is open to all holders of Red Cross First Aid certificates, and, in special cases, to

others who have been instructed in First Aid under the auspices of the Red Cross and yet may not hold certificates.

These prizes are not, however, open to railroad men, for whom special prizes in like amounts are provided from a fund known as "The William Howard Taft Fund."

Prizes are also offered to the life-saving corps. For full information on this subject apply to the nearest Chapter or to the Division Office.

Physicians who serve as instructors, or any other person who gives his or her services in any of the First Aid activities for a period of three years, in a manner satisfactory to the Red Cross will receive a certificate from the Red Cross in recognition of such services.

In appropriate cases, assistance and help in this humane work will be acknowledged by a vote of thanks of the Red Cross.

Boys and girls of sixteen years of age and over having studied under an authorized First Aid instructor may compete for merit badges. Girl and Boy Scouts obtain these badges through their respective organizations, after passing tests recommended by the American Red Cross. Information regarding these tests can be obtained from the Girl Scouts' Headquarters, 189 Lexington Ave., New York City, and the Boy Scouts' Headquarters, 200 Fifth Ave., New York City.

A Scout holding a merit badge may take a school course under Red Cross auspices and get the Red Cross certificate on his school examination by applying to a local Chapter. To do this he must have attained an average of 75 per cent or more in the examination and this fact must be certified to by his principal.

First Aid Contests

The American Red Cross is prepared to assist in promoting First Aid Contests anywhere in the country. At such Contests or "meets" four or five problems are presented for the solution of the competing team. Judges mark all

the teams, and prize medals and prize certificates are awarded to the winners. The Borglum medal is awarded to each member of the team taking first place and certificate for the second team. Whenever Red Cross prizes are awarded, the Red Cross must be represented among the judges, and all judges must be physicians. If timely request is made, the Red Cross can supply most of the judges for these occasions. This has been the custom for years in certain localities.

The rules for conducting First Aid Contests, and problems for the practice of teams, from which selections may be made at First Aid Contests, are set forth in a pamphlet entitled: *First Aid Contests*, which may be obtained upon application to the local Chapter or the Division Office. Those, at the time this edition goes to press, are as follows:

Rules for a First-aid Contest

Team and Captain.

1. A team should be composed of five men, including a captain. Any employee of a company may be a member of a contesting team, provided he is not a physician or a trained nurse.

2. The captain will select the patient and designate the member or members of the team to perform the event.

3. A captain will control his team in their field work and stretcher drill, but only when the full team is engaged. The captain or other members must not prompt the person or persons performing the event unless he or they are actually participating in that event.

4. The captain may himself contest in a one-man or two-man event.

5. At the conclusion of any event the captain must raise his right hand and announce his team number. The team will remain at its post until relieved by its judge.

6. The teams shall be numbered consecutively, beginning at No. 1 and they must occupy the positions assigned to them on the field.

Definition and Announcement of Events.

7. An event embraces a problem which may call for the treatment of one or more injuries and the handling of the patient.

8. The events for the contest will not be announced until the teams are on the field and in their positions, each event being announced just prior to its performance.

9. Time will not be an element in deciding events unless the team or men performing exceed the allotted time or fail to give treatment promptly. All events will commence and be finished at the sounding of a gong or other audible signal, the meaning of which should be communicated to all team captains before the events commence. One gong should sound two minutes before an event is to start, two gongs should sound to start an event, and three gongs should sound to mark the end of the time allotted to an event.

Equipment.

10. Teams must bring their own First-aid materials, including bandages, splints, blankets, etc., and shall not be allowed to leave the vicinity of the patient in order to obtain material.

11. The triangular bandage shall be the standard used in the contest, but roller bandages may be used, and equal credit will be given for their proper use.

12. All splints must be prepared on the field for each event requiring their use, but not before the event commences.

Judges and Their Duties.[1]

13. Each judge will be required to scrutinize the work done in each event and may call on the captain or member who applies a dressing to explain his treatment.

14. Judges will perform their work progressively. If there is a sufficient number of judges, judge No. 1 will judge team No. 1 in event No. 1; judge No. 2 will judge team No. 2 in event No. 2, etc. Where it is necessary to have each judge scrutinize two or more teams at a time,

[1] A specimen discount record card is shown on page 222.

the same procedure will be followed as far as practicable. Judges will then progress in each event to the team or teams of next higher numerical designation, returning to the first team or teams when they have progressed through all of the others. There shall be a chief judge who will be in charge and who will select the judges. He will convene his associates not later than the morning of the contest for conference, at which time events will be selected for the contest from the list which has been previously furnished each team by the association under whose auspices the events are being held. At this conference the judges will decide upon what they will accept as proper treatment for each event, the time to be allowed for each event, and the time to be allowed between each event for the removal of dressings, and other necessary details, so that there may be a complete understanding among the judges before they proceed to the field. Their decision regarding the time allowed for events and for removal of dressings should be communicated to team captains by the officials of the meet before each event begins.

15. Each judge will mark the team number, event, and discounts for each team, sign his name and deliver the record to the chief judge after each event, who, in turn, will deliver it to the recorders to be checked. Suitable record cards for the use of the judges shall be printed in advance and turned over to the chairman of the judges the day before the contest.

Duties of Recorders.

16. The recorders will add the discounts and mark the points made by each team in each event. The total points made in full-team events (see rule 17) will be divided by the number of such events and the quotient will be the average for each team for the whole contest.

Award of Prizes.

17. One-man and two-man events by members of a team cannot be considered in awarding prizes to full teams. For

this purpose teams must compete in 3 full-team events, upon their work in which they will be rated.

18. The patient, if trained in First Aid, will be required to demonstrate his ability by participating in one of the one-man or two-man events in order to be awarded a prize with his team if it is a successful contestant in the full-team events. If not trained in First Aid he may be awarded a souvenir medal such as other untrained patients are given.

19. All ties shall be decided by drawing lots or, if time permits, a special event may be contested to determine the relative standing.

20. The points made in events performed to decide a tie shall not be included in the total points made in the whole contest.

21. Teams which make the highest average and a tie score in events for which honors or prizes are offered shall precede all other teams having a less score in the original events.

22. Prizes will be listed by the committee on awards.

23. Donors of prizes will be required to inform the committee on awards as to the manner in which their prizes shall be awarded, based upon these rules.

Discounts and Penalties. (See page 222.)

General Rulings.

25. No practicing will be allowed on the field before the beginning of the contest.

26. All proposed exceptions to these rules must be made to the committee on rules not later than 10 days prior to the day of the contest. The decision of the committee will be final.

27. The general edition of the American Red Cross Text Book on First Aid is hereby authorized.

A Few Suggested Problems Which May Be Practiced by Members of First-aid Teams before Contests

The following events are submitted for practice by the teams which will enter the contest. On the days of the demonstration and contests the judges will select from this list the events to be performed.

One-man Events

1. Four fingers of left hand severely crushed, with lacerated wound of palm of hand, which is bleeding profusely. Treat and carry patient 20 feet by shoulder-lift.

2. Lacerated scalp wound on top of head with profuse bleeding. Evidence of severe shock. Treat.

3. Patient has fallen, breaking left arm below elbow. No break in skin. Treat.

4. Man has been overcome by gas. It is impossible for bearer to stand erect in carrying him. Carry him 20 feet to place where bearer can assume erect position; then carry for 20 feet by shoulder-carry. Perform artificial respiration by Schaefer method for one minute.

5. Man found unconscious on charged electric wire; burned on right hand and forearm. Remove and treat.

6. Lacerated wound of center of forehead and lacerated wound of palm of right hand. Treat.

7. Patient suffering from severe burn (scald) of the right hand and right forearm. Treat.

8. Right cheek cut and bleeding; right forearm cut and bleeding. Bright red blood from both wounds. Treat.

9. Treat a simple fracture of the right collar bone.

10. Man has been overcome by smoke inhalation. Perform one-man carry for 25 feet and treat patient.

Two-man Events

1. Simple fracture of right forearm, and scalp wound on back of head. No bleeding. Treat and carry patient 30 feet without using a stretcher.

2. A car has run over a patient's left foot, cutting it off in front of ankle joint. There is severe bleeding. Treat and carry patient 30 feet by two-handed seat.

3. Compound fracture of the leg below the knee, involving both bones. Prepare patient to stand transportation.

4. Compound fracture of right forearm, with punctured wound in palm of right hand, which is bleeding profusely. Treat.

5. Patient found unconscious, abdomen resting on an electric wire. There is a simple fracture of the right forearm. Rescue and treat the case. Artificial respiration should be performed for two minutes.

6. Severe burns on face, neck, ears, and both hands, from steam. Treat and carry patient 20 feet without a stretcher.

7. Left collar bone broken; simple fracture of left thigh. Treat.

8. Man found lying face-up, shoulders resting on electric wire; unconscious; shoulders burned. Rescue and give treatment.

9. Punctured wound in palm of right hand; profuse bright red bleeding; cut on calf of left leg, bleeding bright red blood. Treat and carry 50 feet.

10. Simple fracture of right forearm; right lower jaw broken. Treat and carry on improvised stretcher.

11. Simple fracture of right leg below knee; fracture of 5th and 6th ribs on right side. Treat the case.

12. Lacerated scalp wound on top of head; broken kneecap (simple fracture). Treat and prepare for transportation.

Three-man Events

1. Left ear torn off, with very little bleeding; left shoulder dislocated; compound fracture of left leg. Treat the case.

2. Patient found unconscious from inhalation of smoke; right forearm broken. Treat and carry 50 feet.

3. Burns of head, face, arms, and hands; profound shock. Treat.

4. Flesh torn off back of left hand; left shoulder dislocated; compound fracture of left leg. Treat the case.

5. Simple fracture of both forearms; big toe on right foot cut off; profuse bright red bleeding. Treat the case.

6. Punctured wound of palm of right hand, bleeding bright red blood; small cut on calf of left leg with slight bleeding; left ankle sprained. Treat the case.

Full-team Events

1. Simple fracture of right thigh; compound fracture of left arm above elbow. Treat and carry on an improvised stretcher.

2. Compound fracture of left thigh; wound 3 inches long on calf of right leg; cut on outer surface of right forearm with profuse bleeding. Treat and carry patient on an improvised stretcher 25 yards.

3. Man has been run over and right arm cut off close to shoulder; profuse bleeding; several ribs broken on right side. Treat and carry on a stretcher.

4. Man has been found under a fall of rock with broken back. Treat and prepare patient for transportation.

5. Treat a compound fracture of both bones of the right leg; severe bleeding. There are also burns on both hands, right arm, and right side of face, due to gas explosion.

6. Patient found unconscious, lying on his back across live electric wire. Rescue and give artificial respiration for one minute. Then treat burns on the back and right upper arm. Carry 30 feet on any kind of an improvised stretcher except one made of poles and coats.

7. Man overcome by gas, requiring immediate removal. Burns on hands, arms, neck, and face. Carry patient 10 feet on an improvised stretcher. Two of team at that time should be supposedly overcome by gas. Remainder of team carry patient, without a stretcher, for 20 feet to fresh air and treat the case.

8. Man found under a wreck with punctured wound of abdomen; broken rib on left side; cut on right side of head, bleeding in spurts. Treat case and three men carry patient for 20 feet as if in passage which is too narrow to permit the use of a stretcher.

9. As the result of a fall, man has simple fracture of left collar bone; also simple fracture of right thigh. Prepare patient for transportation and carry on stretcher 20 feet.

10. Man has been rescued following an explosion and has sustained the following injuries; burn of back of head and neck, simple fracture of right leg below the knee, and compound fracture of the kneecap of the left leg. Treat.

11. Broken back with simple fracture of right forearm. Treat and prepare for transportation.

12. Fracture of the right collar bone; lacerated wound palm of right hand; dislocation of left shoulder. Treat and prepare patient for transportation.

13. Man has fallen on electric wire, face down; clothing is burning. Rescue and treat burns of front of chest and both arms.

14. Left leg cut off six inches below the knee; simple fracture of right leg. Treat.

15. Simple fracture of both forearms; great toe on right foot cut off; compound fracture of right wrist with bright red bleeding. Treat.

16. Treat a broken kneecap, dislocated right shoulder, and fracture of jaw. Improvise a stretcher and carry 25 feet.

17. Treat a compound fracture of right ankle, a simple fracture of right arm, and injury to scalp.

18. Treat burns on the back and neck, injury to left eye, and lacerated wound of right groin.

19. Dislocation of right shoulder; left kneecap broken; left eyeball injured. Treat and carry on stretcher 25 feet.

20. Right hand cut off; simple fracture of left thigh; laceration of scalp. Treat and carry on blanket stretcher.

Problem No. Sample	STANDARD DISCOUNT RECORD CARD FOR FIRST AID CONTESTS	Team No.

INTERNATIONAL FIRST-AID CONTEST

St. Louis, Mo. September 1, 2, 1921.

JUDGES' SCORE CARD

Reading Time 1½ Minutes—Working Time 8 Minutes

PROBLEM: Sample. Treat the following injuries: Simple fracture middle of right thigh, cut on inner side of left forearm, 4" above wrist, bleeding in spurts. Patient in state of shock but conscious.

		Discount
1. Not doing the most important thing first:		
(*a*) Failure to temporarily control hemorrhage previous to application of tourniquet	7	.....
(*b*) Failure to remove patient from dangerous gas, roof, electric wire, ect. at proper time	4	.....
(*c*) Failure to do the most important thing first otherwise than specified in (*a*) and (*b*)	6	
2. Slow and indifferent work:		
(*a*) Slowness in work—Deduct one point for each minute or fraction thereof consumed over time alloted for working problem	1	.....
(*b*) Lack of attention on part of one or more team members	2	.....
(*c*) Lack of neatness	1	.....
3. Defects in Bandaging:		
(*a*) Failure to entirely cover wound	2	.....
(*b*) Bandaging or treating wrong location of injury	2	.....
(*c*) Tight bandage	2	.....
(*d*) Loose bandage	2	.....
(*e*) Improperly applied bandage	2	.....
(*f*) Insecure or granny knot	1	.....
4. Defects in artificial respiration:		
(*a*) Improper or insufficient preparation of patient for artificial resuscitation	3	.....
(*b*) Incorrect timing of artificial respiration	2	.....
(*c*) Ineffective method of artificial respiration	9	.....
5. Splints:		
(*a*) Splint improperly padded	2	.....
(*b*) Splint improperly applied	4	.....
6. Unclean first-aid material	3	.....
7. Failure to be aseptic	9	.....
8. Failure to have on hand sufficient and proper material to complete dressings	3	.....
9. Awkward handling of patient	4	.....
10. Assistance lent by patient	2	.....
11. Arterial bleeding:		
(*a*) Application of tourniquet so as to not stop bleeding	10	.....
(*b*) For non-application of tourniquet charge additional to (*a*)	2	.....
(*c*) Tourniquet applied so as to stop bleeding but at wrong points, or in such way as to injure patient	4	.....
12. Not treating shock	6	.....
13. Failure to command properly	1	.....
14. Improper treatment not covered by above, such as wrong dressings, etc	4	.....
TOTAL		
JUDGE..... RECORDER.....		.....

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